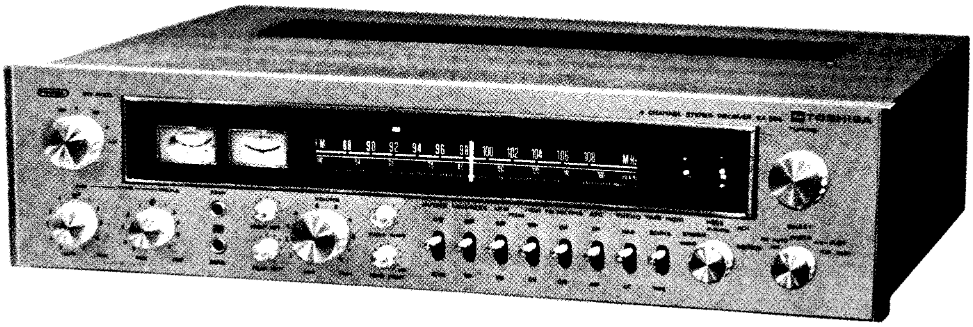
TOSHIBA 4 CHANNEL STEREO RECEIVER

SERVICE DATA

MODEL SA-504

FILE NO. 170-006
REVISED EDITION



SPECIFICATIONS

■ TUNER SECTION

■ FM Part

Frequency range: 88～108 MHz
Usable sensitivity (IHF): 1.8μV
Distortion factor: MONO 0.3% (400 Hz 100%)
STEREO 0.5% (400 Hz 100%)
Signal to noise ratio: 66 dB
Frequency response: 20 Hz～15 kHz ±1 dB
Selectivity (IHF) 80 dB
Image rejection ratio: 80 dB
IF rejection ratio: 80 dB
Capture ratio: 1.5 dB
Spurious rejection ratio: 100 dB
AM suppression ratio: 46 dB
FM stereo separation: 35 dB (400 Hz)

■ AM Part

Frequency range: 530～1,605 kHz
Usable sensitivity: 48 dB/m
(S/N 20 dB)
15μV (IHF)
Distortion factor: 1%
Image rejection ratio: 70 dB
IF rejection ratio: 65 dB
Signal to noise ratio: 50 dB
Selectivity: 25 dB (±10 kHz)

■ AUDIO SECTION

IHF music power: 200W 4Ω (at 0.4% distortion)
180W 8Ω (at 0.4% distortion) BTL
r.m.s (continuous) output:
At each channel driven: 35W x 4 8Ω (less than 0.4% distortion 1 kHz)
70W x 2 8Ω (less than 0.4% distortion 1 kHz) BTL
Harmonic distortion: 0.4% or less (35W at 1 kHz)
Inter modulation distortion: 0.4% or less
Frequency response: 10 Hz～55 kHz + 1/-3 dB
IHF power band with: 10 Hz～40 kHz
Input sensitivity and impedance: PHONO MAG 2.5 mV (47 kΩ)
CC 30 mV (70 kΩ)
AUX 1.2 (4CH) 150 mV (47 kΩ)
TAPE PLAY 150 mV (47 kΩ)
MAIN IN 550 mV (47 kΩ)
Recording output level: TAPE REC 150 mV
DIN 30 mV
Signal-to-noise ratio: PHONO (2.5 mV) 65 dB
CC (30 mV) 70 dB
AUX 1.2 (4CH) (150 mV) 75 dB
Residual noise: 1.5 mV or less
Speaker impedance: 4～16Ω
BASS (100 Hz): ±10 dB
TREBLE (10 kHz): ±10 dB
LOUNDNESS control: + 10 dB (100 Hz at VR 20%)
+ 4 dB (10 kHz at VR 20%)
Damping factor: 20 (8Ω)

■ Power source and Others

Power source: 100V/120V/220V/240V, 50 Hz/60 Hz
Power consumption: 150W
Dimensions: 500 (W) x 380 (D) x 115 (H) (mm)
(19½" W x 15" D x 4½" H)
Weight: 13 kg
(28.8 Lbs)

■ Semiconductors

Transistor: 75
FET: 3
Diode: 34
IC: 3

MC-Service

TOKYO SHIBAURA ELECTRIC CO., LTD.

2-1, 5-CHOME, GINZA, CHUO-KU, TOKYO, JAPAN

Toshiba

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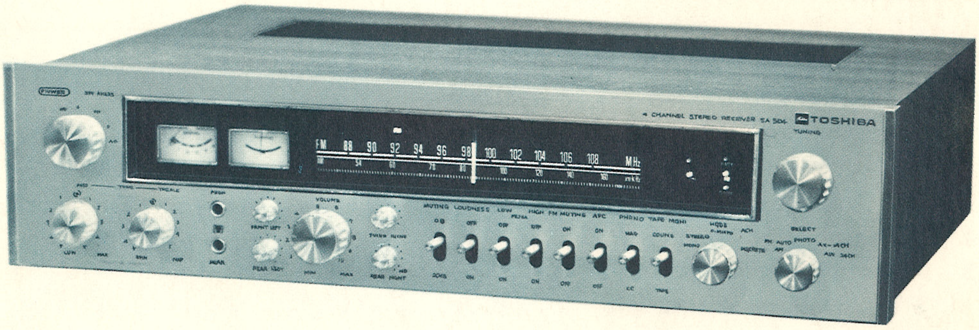
POWER
4 CHANNEL STEREO RECEIVER SA 504
TOSHIBA
TUNING
FM 88 90 92 94 96 98 100 102 104 106 108 MHz
VOLUME
SELECT

HM

SPECIFICATIONS

■ TUNER SECTION

■ FM Part

Frequency range:	88～108 MHz
Usable sensitivity (IHF):	1.8μV
Distortion factor:	MONO 0.3% (400 Hz 100%) STEREO 0.5% (400 Hz 100%)
Signal to noise ratio:	66 dB
Frequency response:	20 Hz～15 kHz ±1 dB
Selectivity (IHF)	80 dB
Image rejection ratio:	80 dB
IF rejection ratio:	80 dB
Capture ratio:	1.5 dB
Spurious rejection ratio:	100 dB
AM suppression ratio:	46 dB
FM stereo separation:	35 dB (400 Hz)

■ AM Part

Frequency range:	530～1,605 kHz
Usable sensitivity:	48 dB/m (S/N 20 dB) 15μV (IHF)
Distortion factor:	1%
Image rejection ratio:	70 dB
IF rejection ratio:	65 dB
Signal to noise ratio:	50 dB
Selectivity:	25 dB (±10 kHz)

■ AUDIO SECTION

IHF music power:	200W 4Ω (at 0.4% distortion)		
	180W 8Ω (at 0.4% distortion) BTL		
r.m.s (continuous) output: At each channel driven:	35W x 4 8Ω (less than 0.4% distortion 1 kHz)		
	70W x 2 8Ω (less than 0.4% distortion 1 kHz) BTL		
Harmonic distortion:	0.4% or less (35W at 1 kHz)		
Inter modulation distortion:	0.4% or less		
Frequency response:	10 Hz～55 kHz + 1/-3 dB		
IHF power band with:	10 Hz～40 kHz		
Input sensitivity and impedance:	PHONO MAG	2.5 mV (47 kΩ)	
	CC	30 mV (70 kΩ)	
	AUX 1.2 (4CH)	150 mV (47 kΩ)	
	TAPE PLAY	150 mV (47 kΩ)	
	MAIN IN	550 mV (47 kΩ)	
Recording output level:	TAPE REC	150 mV	
	DIN	30 mV	
Signal-to-noise ratio:	PHONO	(2.5 mV)	65 dB
	CC	(30 mV)	70 dB
	AUX 1.2 (4CH)	(150 mV)	75 dB
Residual noise:	1.5 mV or less		
Speaker impedance:	4～16Ω		
BASS (100 Hz):	±10 dB		
TREBLE (10 kHz):	±10 dB		
LOUNDNESS control:	+ 10 dB	(100 Hz at VR 20%)	
	+ 4 dB	(10 kHz at VR 20%)	
Damping factor:	20 (8Ω)		

■ Power source and Others

Power source:	100V/120V/220V/240V, 50 Hz/60 Hz
Power consumption:	150W
Dimensions:	500 (W) x 380 (D) x 115 (H) (mm) (19½" W x 15" D x 4½" H)
Weight:	13 kg (28.8 Lbs)

■ Semiconductors

Transistor:	75
FET:	3
Diode:	34
IC:	3

TOKYO SHIBAURA ELECTRIC CO., LTD.

2-1, 5-CHOME, GINZA, CHUO-KU, TOKYO, JAPAN

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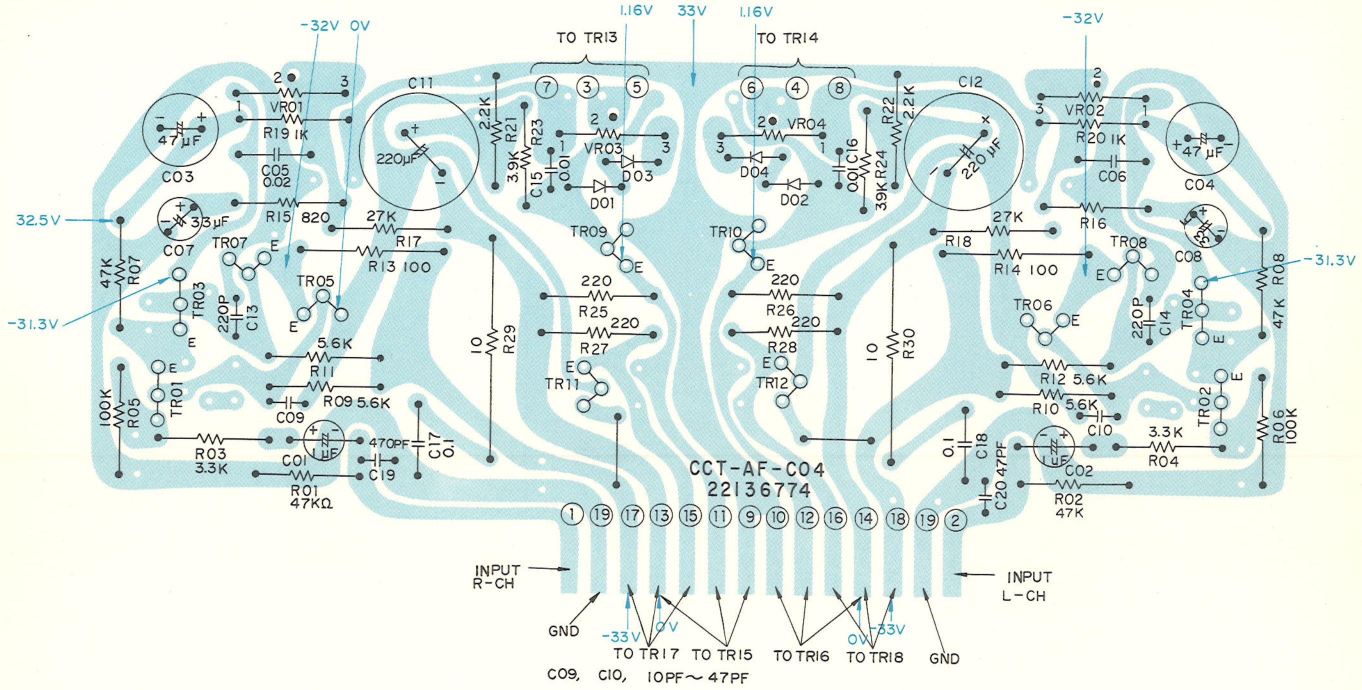
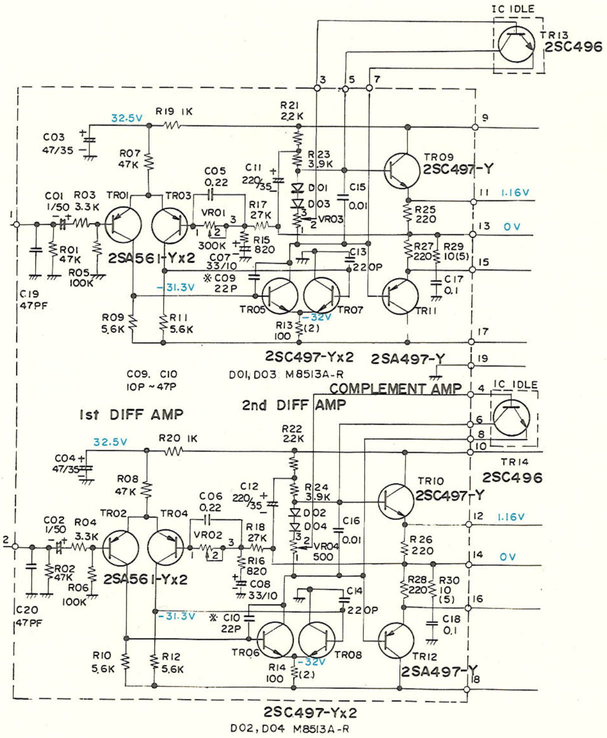
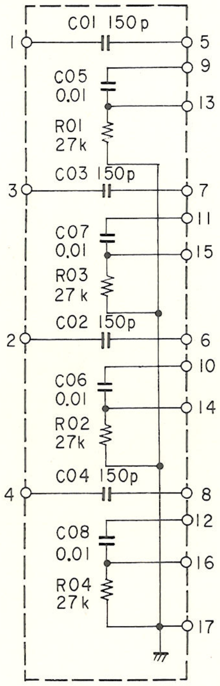
DRIVER CIRCUIT BOARD (CCT-AF-C04)


-32V
0V
1.16V
33V
1.16V
-32V
TO TR13
TO TR14
C11
C12
220μF
VR01
VR02
VR03
VR04
R19 1K
R20 1K
C05 0.02
C06
C03
C04
47μF
33μF
C07
C08
32.5V
-31.3V
-31.3V
R15 820
R16
27K
R17
R18
R13 100
R14 100
TR01
TR02
TR03
TR04
TR05
TR06
TR07
TR08
TR09
TR10
TR11
TR12
R21
R22 2.2K
R23 3.9K
R24 39K
C15 0.01
C16 0.01
D01
D02
D03
D04
R25 220
R26 220
R27 220
R28 220
R29 10
R30 10
220P C13
220P C14
R07 47K
R08 47K
R05 100K
R06 100K
R11 5.6K
R12 5.6K
R09 5.6K
R10 5.6K
C09
C10
R03 3.3K
R04 3.3K
C01
C02
R01 47KΩ
R02 47K
470PF C19
C20 47PF
C17 0.1
C18 0.1
CCT-AF-C04
22136774
① ⑲ ⑰ ⑬ ⑮ ⑪ ⑨ ⑩ ⑫ ⑯ ⑭ ⑱ ⑲ ②
③ ⑤ ⑦ ⑥ ④ ⑧
INPUT R-CH
INPUT L-CH
GND
-33V
0V
TO TR17
TO TR15
TO TR16
0V
-33V
TO TR18
GND
C09, C10, 10PF～47PF


IC IDLE
TR13 2SC496
32.5V
R19 1K
R21 2.2K
C03 47/35
R07 47K
C05 0.22
C11 220/35
R23 3.9K
TR09 2SC497-Y
C01 1/50
R03 3.3K
TR01
TR03
VR01
R17 27K
D01
D03
VR03
C15 0.01
R25 220
1.16V
0V
R01 47K
R05 100K
2SA561-Yx2
300K
C07 33/10
R15 820
C13 220P
R27 220
R29 10(5)
C17 0.1
C19 47PF
-31.3V
※C09 22P
TR05
TR07
TR11
R09 5.6K
R11 5.6K
R13 100
-32V
2SC497-Yx2
2SA497-Y
C09, C10 10P～47P
D01, D03 M8513A-R
COMPLEMENT AMP
IC IDLE
1st DIFF AMP
2nd DIFF AMP
32.5V
R20 1K
R22 22K
TR14 2SC496
C04 47/35
R08 47K
C06 0.22
C12 220/35
R24 3.9K
TR10 2SC497-Y
TR02
TR04
VR02
R18 27K
D02
D04
VR04 500
C16 0.01
R26 220
1.16V
0V
C02 1/50
R04 3.3K
R02 47K
R06 100K
2SA561-Yx2
R16 820
C08 33/10
C14 220P
R28 220
R30 10 (5)
C18 0.1
C20 47PF
-31.3V
※ C10 22P
TR06
TR08
TR12
R10 5.6K
R12 5.6K
R14 100
-32V
2SA497-Y
2SC497-Yx2
D02, D04 M8513A-R

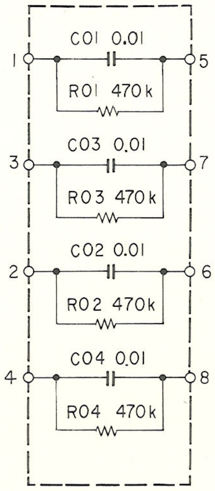
LOUDNESS CIRCUIT BOARD

(CCT-SWI-C01)

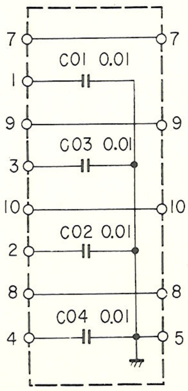

C01 150p
C05 0.01
R01 27k
C03 150p
C07 0.01
R03 27k
C02 150p
C06 0.01
R02 27k
C04 150p
C08 0.01
R04 27k
1
3
2
4
5
9
13
7
11
15
6
10
14
8
12
16
17

FILTER CIRCUIT BOARD

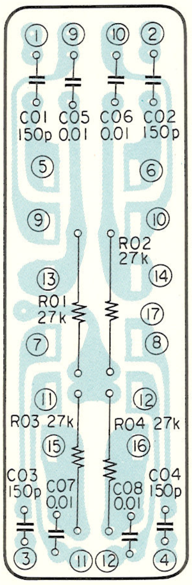
LOW (CCT-SWI-C03)

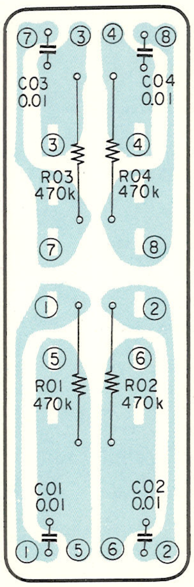

C01 0.01
R01 470k
C03 0.01
R03 470k
C02 0.01
R02 470k
C04 0.01
R04 470k
1
3
2
4
5
7
6
8

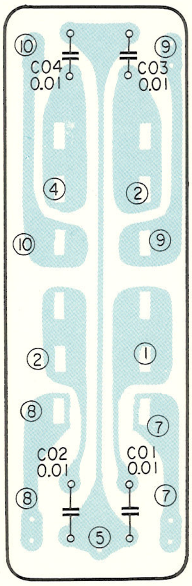
HIGH (CCT-SWI-C02)


C01 0.01
C03 0.01
C02 0.01
C04 0.01
7
1
9
3
10
2
8
4
5

BOTTOM VIEW

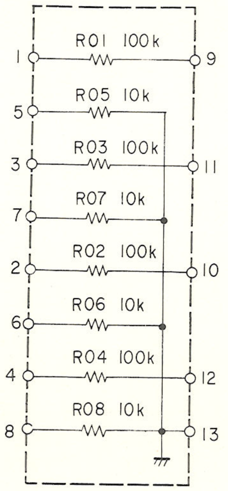

①
⑨
⑩
②
C01 150p
C05 0.01
C06 0.01
C02 150p
⑤
⑥
⑨
⑩
R02 27k
⑬
⑭
R01 27k
⑰
⑦
⑧
⑪
⑫
R03 27k
R04 27k
⑮
⑯
C03 150p
C07 0.01
C08 0.01
C04 150p
③
⑪
⑫
④


⑦
③
④
⑧
C03 0.01
C04 0.01
③
④
R03 470k
R04 470k
⑦
⑧
①
②
⑤
⑥
R01 470k
R02 470k
C01 0.01
C02 0.01
①
⑤
⑥
②


⑩
⑨
C04 0.01
C03 0.01
④
②
⑩
⑨
②
①
⑧
⑦
C02 0.01
C01 0.01
⑧
⑤
⑦

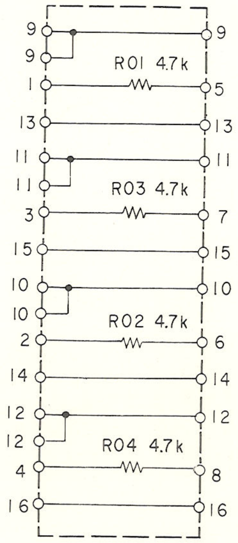
MUTING CIRCUIT BOARD

(CCT-SWI-C05)

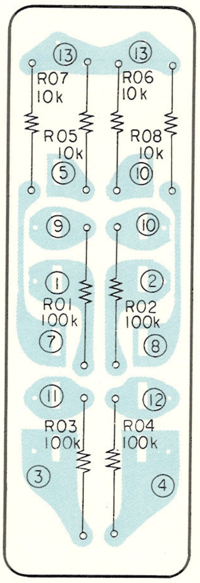

R01 100k
R05 10k
R03 100k
R07 10k
R02 100k
R06 10k
R04 100k
R08 10k
1
9
5
3
11
7
2
10
6
4
12
8
13

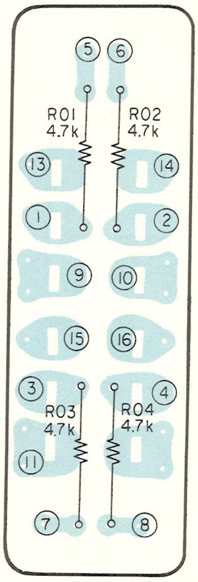
TAPE MONITOR CIRCUIT BOARD

(CCT-SWI-C06)


9
9
9
R01 4.7k
1
5
13
13
11
11
11
R03 4.7k
3
7
15
15
10
10
10
R02 4.7k
2
6
14
14
12
12
12
R04 4.7k
4
8
16
16

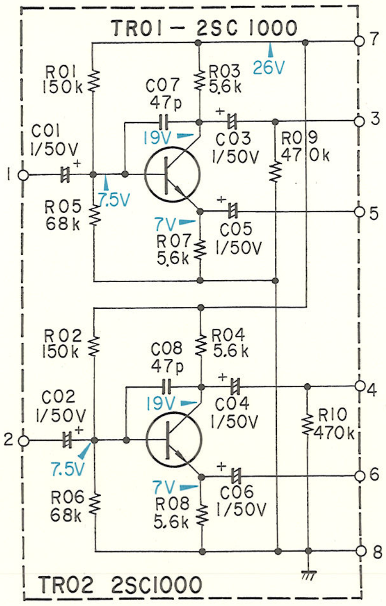
BOTTOM VIEW


⑬
⑬
R07 10k
R06 10k
R05 10k
R08 10k
⑤
⑩
⑨
⑩
①
②
R01 100k
R02 100k
⑦
⑧
⑪
⑫
R03 100k
R04 100k
③
④


⑤
⑥
R01 4.7k
R02 4.7k
⑬
⑭
①
②
⑨
⑩
⑮
⑯
③
④
R03 4.7k
R04 4.7k
⑪
⑦
⑧

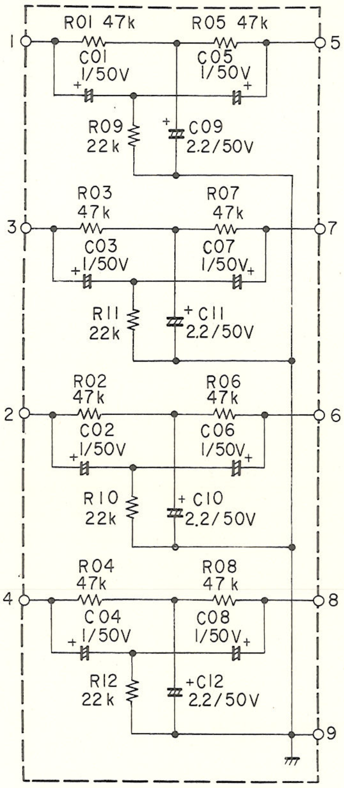
PHASE INVERT CIRCUIT BOARD

(CCT-AF-C13)

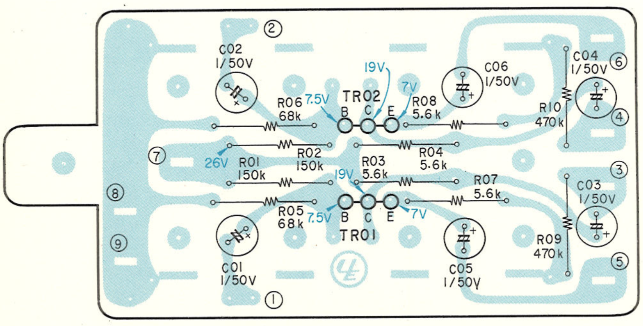

TR01 – 2SC 1000
R01 150k
R03 5.6k
26V
C07 47p
19V
C03 1/50V
R09 470k
C01 1/50V
7.5V
R05 68k
7V
R07 5.6k
C05 1/50V
R02 150k
R04 5.6k
C08 47p
C04 1/50V
R10 470k
C02 1/50V
R06 68k
R08 5.6k
C06 1/50V
TR02 2SC1000
1
2
3
4
5
6
7
8

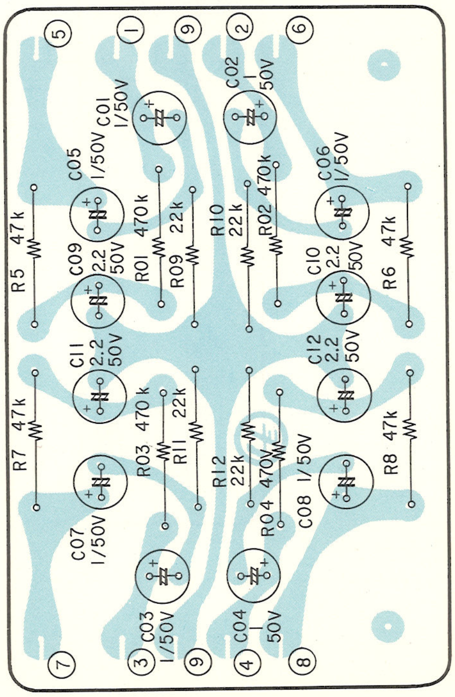
FILTER CIRCUIT BOARD

(CCT-FILT-C01)

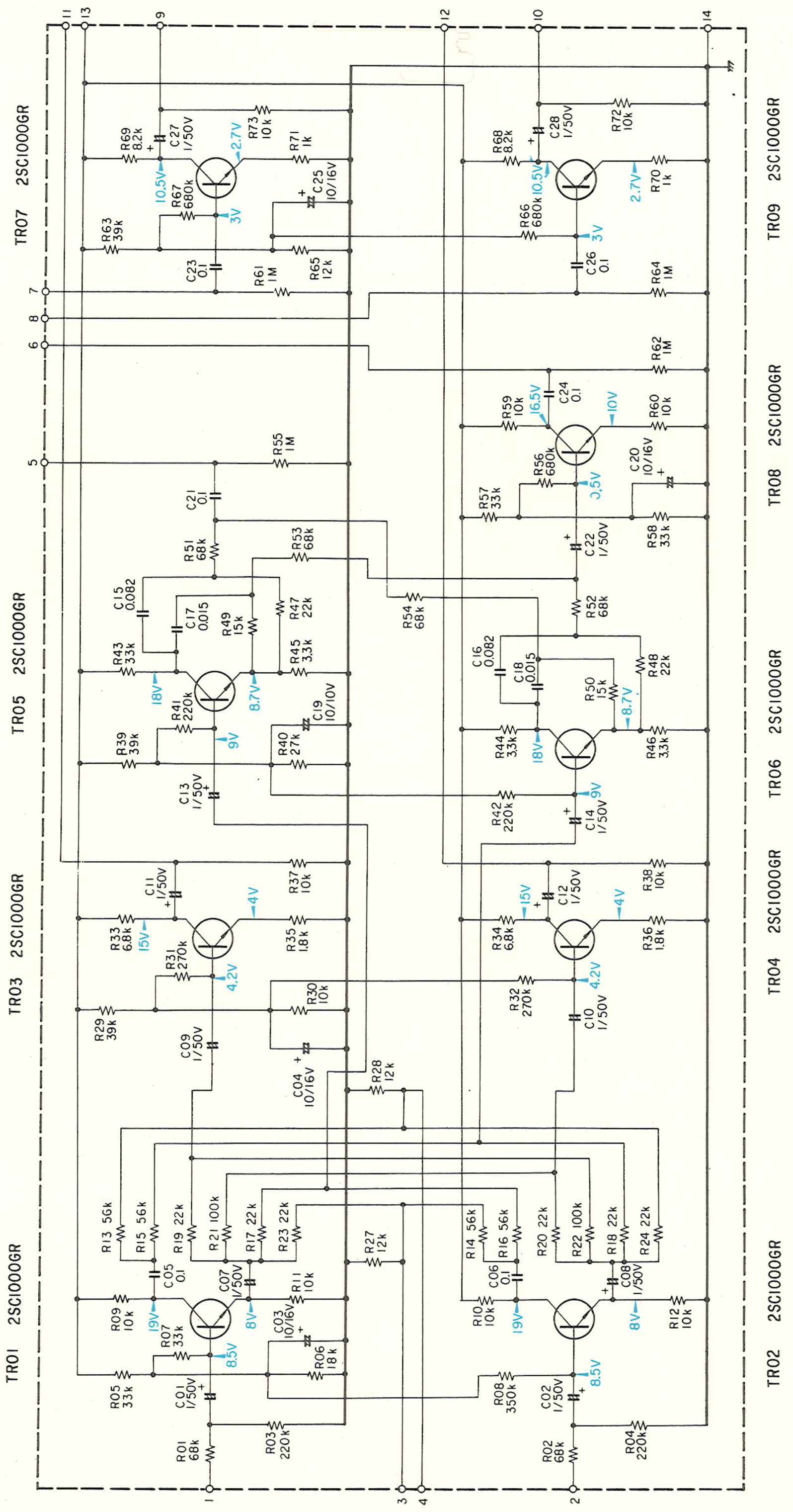

R01 47k
R05 47k
C01 1/50V
C05 1/50V
R09 22k
C09 2.2/50V
R03 47k
R07 47k
C03 1/50V
C07 1/50V
R11 22k
C11 2.2/50V
R02 47k
R06 47k
C02 1/50V
C06 1/50V
R10 22k
C10 2.2/50V
R04 47k
R08 47k
C04 1/50V
C08 1/50V
R12 22k
C12 2.2/50V
1
2
3
4
5
6
7
8
9

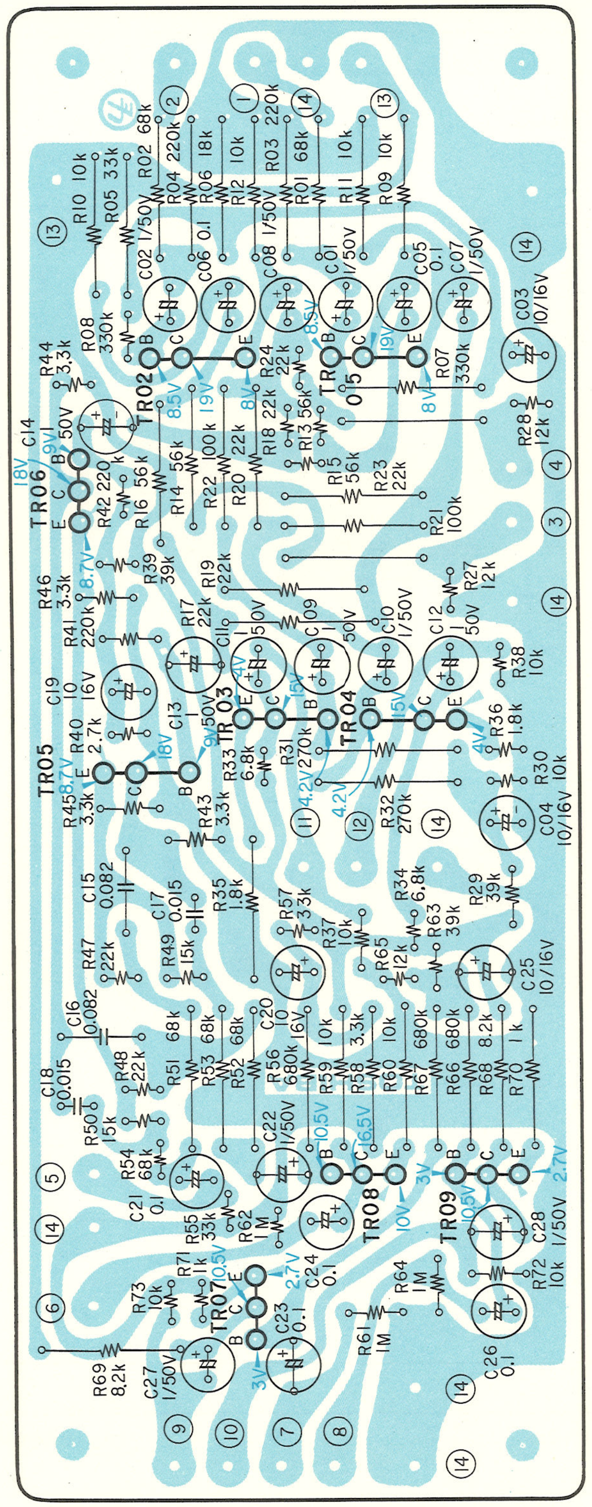
BOTTOM VIEW


C02 1/50V
R06 68k
7.5V
19V
TR02
B C E
7V
R08 5.6k
C06 1/50V
C04 1/50V
R10 470k
26V
R01 150k
R02 150k
R03 5.6k
R04 5.6k
19V
R07 5.6k
C03 1/50V
R05 68k
7.5V
TR01
7V
R09 470k
C01 1/50V
C05 1/50V
①
②
③
④
⑤
⑥
⑦
⑧
⑨

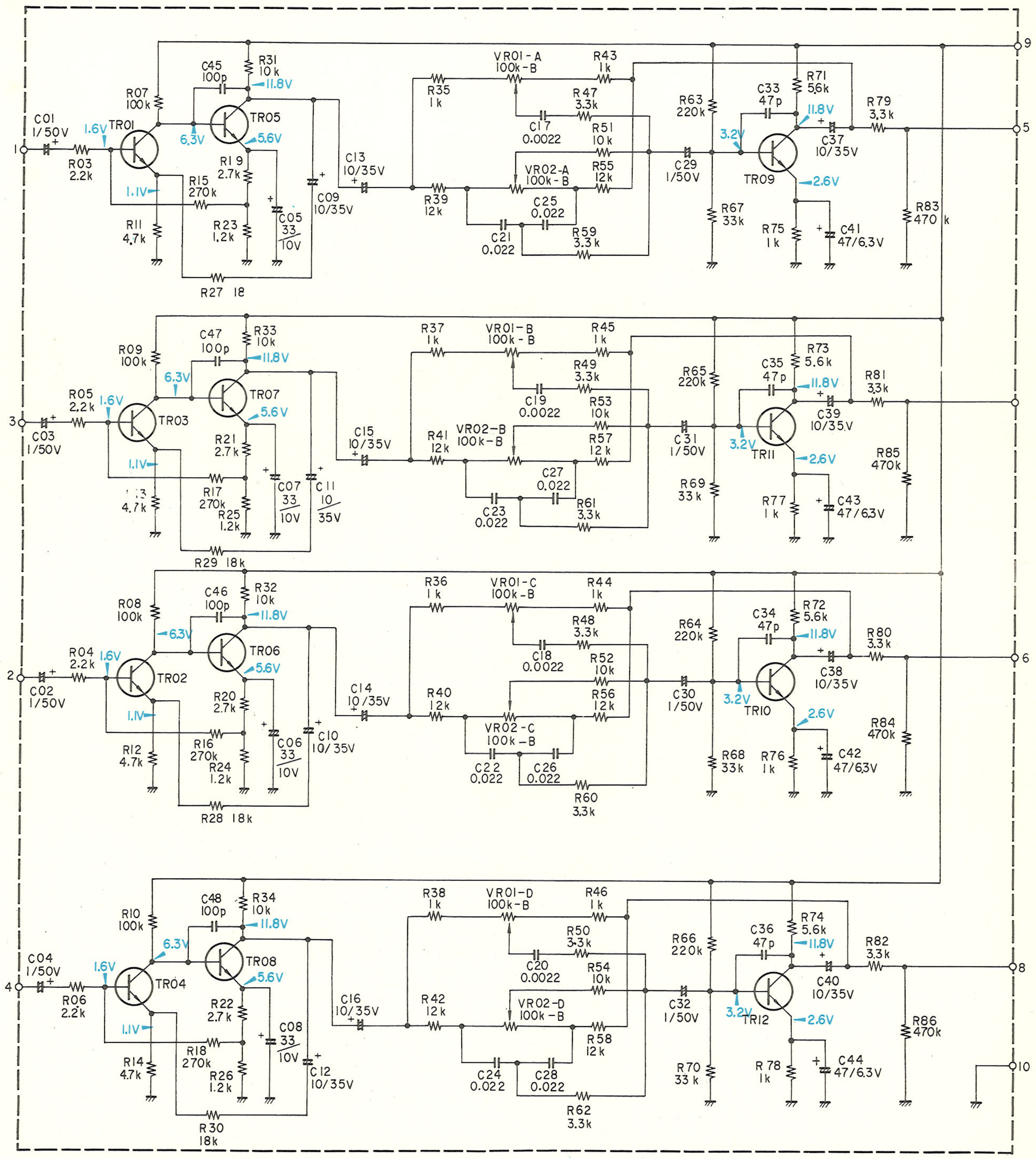

⑤
①
⑨
②
⑥
C01 1/50V
C02 1/50V
C05 1/50V
C06 1/50V
R5 47k
C09 2.2 50V
R01 470k
R09 22k
R10 22k
R02 470k
C10 2.2 50V
R6 47k
C11 2.2 50V
C12 2.2 50V
R7 47k
R03 470k
R11 22k
R12 22k
R04 470k
C08 1/50V
R8 47k
C07 1/50V
C03 1/50V
C04 1/50V
⑦
③
⑨
④
⑧

MATRIX CIRCUIT BOARD (CCT-AF-C10)


TR07 2SC1000GR
TR05 2SC1000GR
TR03 2SC1000GR
TR01 2SC1000GR
TR09 2SC1000GR
TR08 2SC1000GR
TR06 2SC1000GR
TR04 2SC1000GR
TR02 2SC1000GR


TR01
TR02
TR03
TR04
TR05
TR06
TR07
TR08
TR09

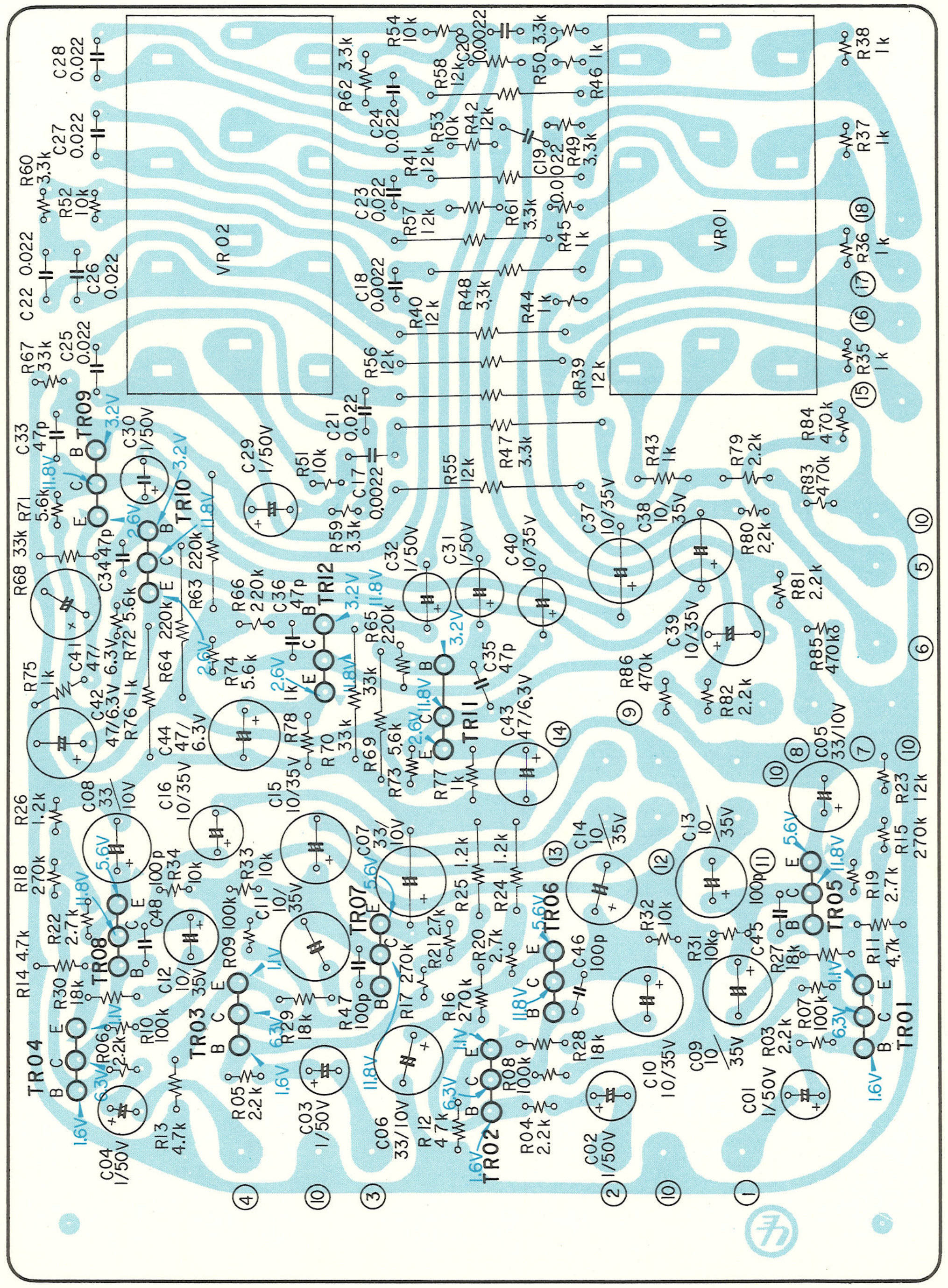
TONE CIRCUIT BOARD (CCT-AF-C14)


C01 1/50V
TR01
R03 2.2k
R07 100k
C45 100p
R31 10k
11.8V
TR05
5.6V
6.3V
1.6V
1.1V
R15 270k
R19 2.7k
R11 4.7k
R23 1.2k
C05 33 10V
C09 10/35V
C13 10/35V
R27 18
VR01-A 100k-B
R43 1k
R35 1k
R47 3.3k
C17 0.0022
R51 10k
VR02-A 100k-B
R55 12k
R39 12k
C25 0.022
C21 0.022
R59 3.3k
R63 220k
C29 1/50V
R67 33k
C33 47p
R71 5.6k
3.2V
TR09
2.6V
C37 10/35V
R75 1k
C41 47/6.3V
R79 3.3k
R83 470k
TR01~TR08 2SC1000GR
TR09~TR12 2SC1000GR
1
2
3
4
5
6
8
9
10

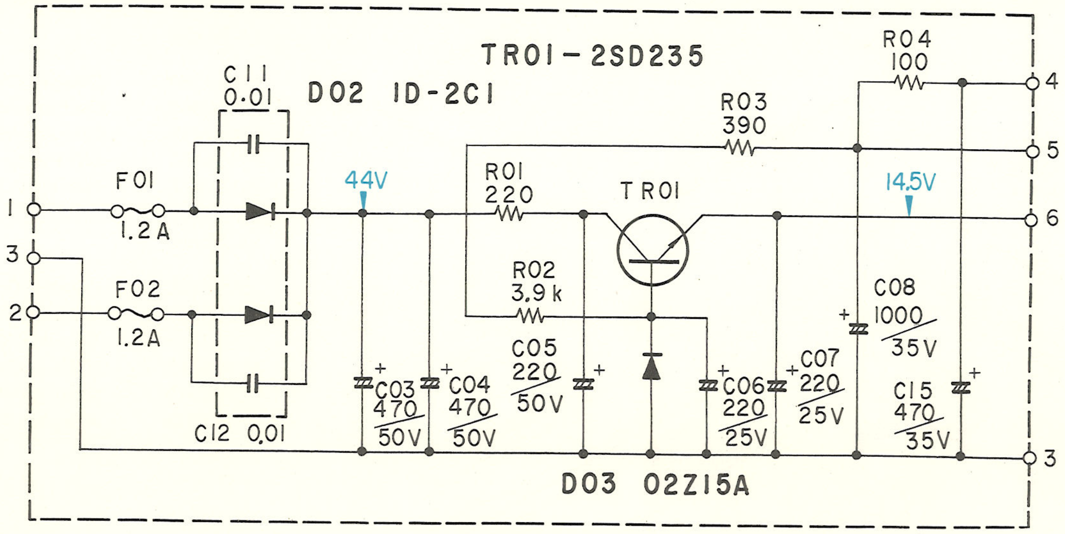
TR01~TR08 2SC1000GR

TR09~TR12 2SC1000GR

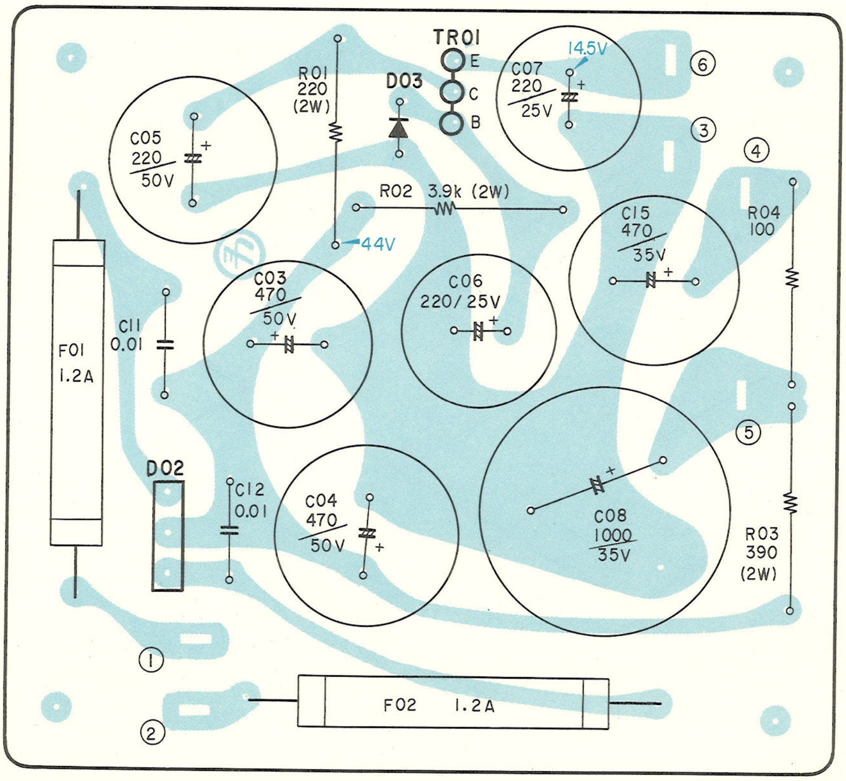
BOTTOM VIEW


VR02
VR01
TR01
TR02
TR03
TR04
TR05
TR06
TR07
TR08
TR09
TR10
TR11
TR12
B C E

POWER SUPPLY CIRCUIT BOARD (CCT-SPLY-C06)

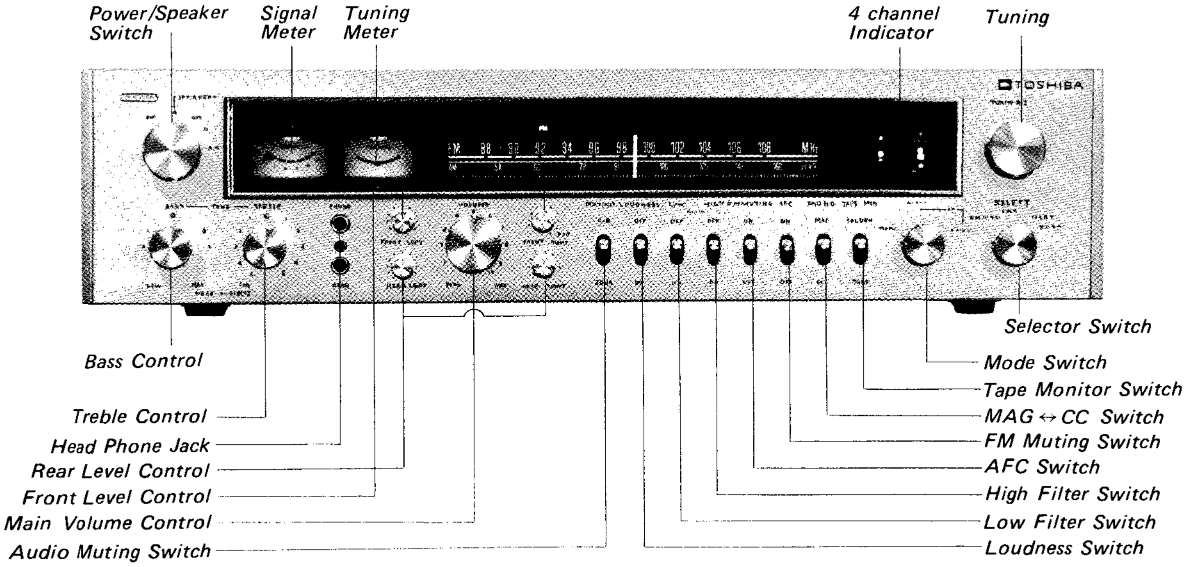

TR01-2SD235
D02 1D-2C1
C11 0.01
F01 1.2A
F02 1.2A
C12 0.01
44V
R01 220
R02 3.9k
R03 390
R04 100
TR01
14.5V
C03 470 50V
C04 470 50V
C05 220 50V
C06 220 25V
C07 220 25V
C08 1000 35V
C15 470 35V
D03 02Z15A
1
2
3
4
5
6

BOTTOM VIEW

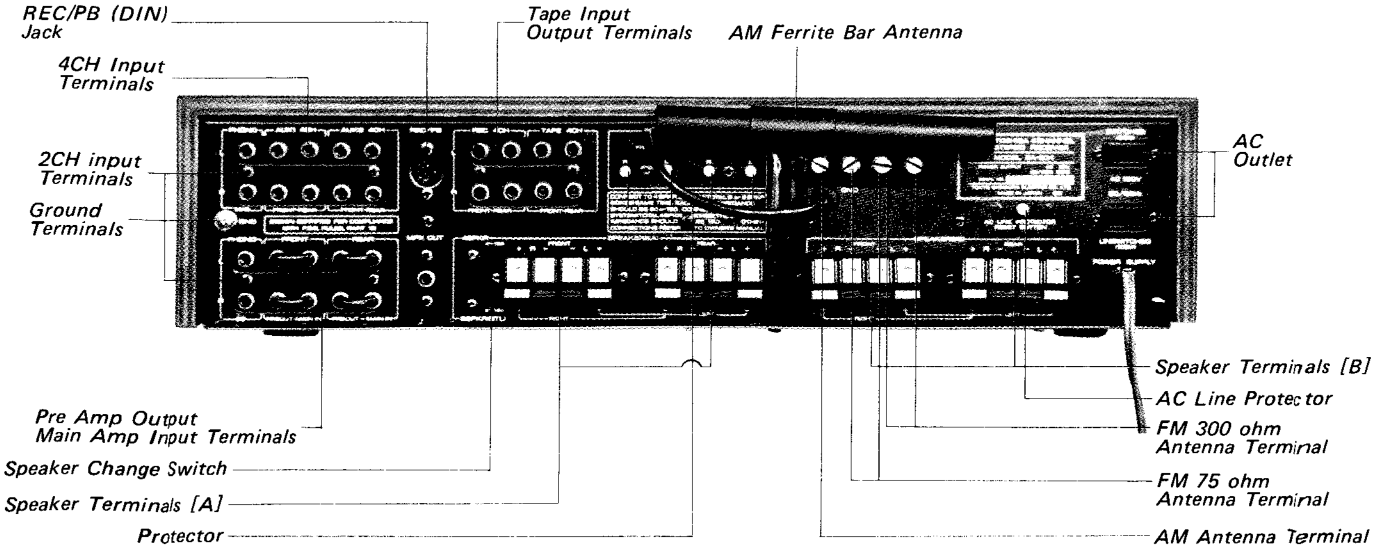

TR01
E
C
B
D03
R01 220 (2W)
C05 220 50V
C07 220 25V
14.5V
R02 3.9k (2W)
44V
C03 470 50V
C06 220/25V
C15 470 35V
R04 100
C11 0.01
F01 1.2A
D02
C12 0.01
C04 470 50V
C08 1000 35V
R03 390 (2W)
F02 1.2A
①
②
③
④
⑤
⑥

1. OPERATING CONTROLS

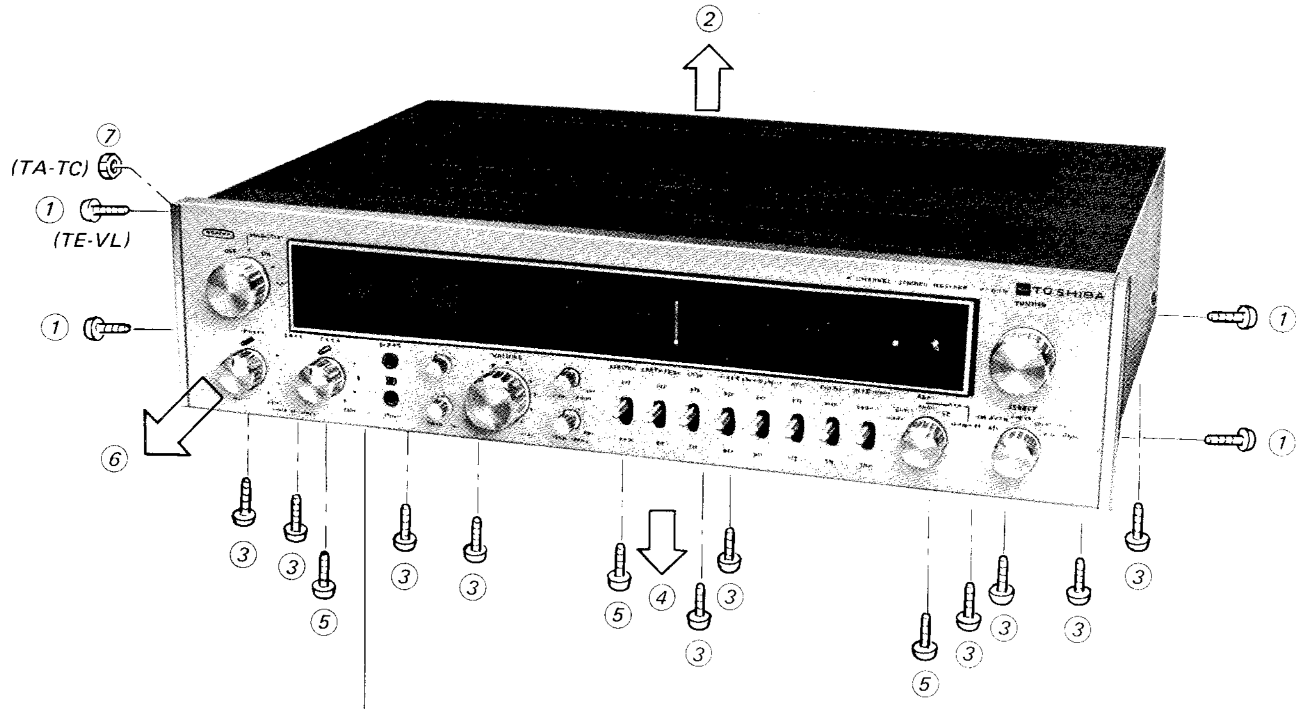
1-1 FRONT VIEW

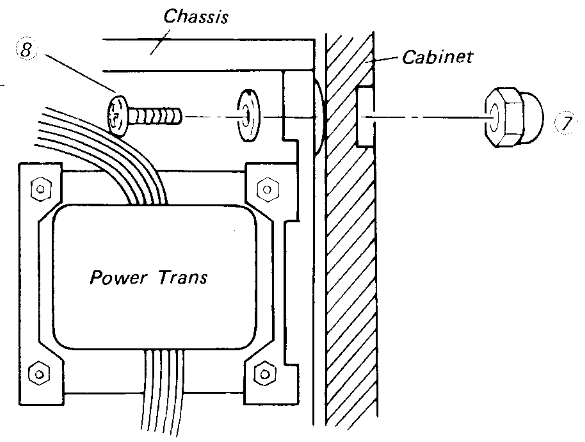

Power/Speaker Switch
Signal Meter
Tuning Meter
4 channel Indicator
Tuning
Selector Switch
Bass Control
Mode Switch
Tape Monitor Switch
Treble Control
MAG ↔ CC Switch
Head Phone Jack
FM Muting Switch
Rear Level Control
AFC Switch
Front Level Control
High Filter Switch
Main Volume Control
Low Filter Switch
Audio Muting Switch
Loudness Switch
TOSHIBA

1-2 REAR VIEW


REC/PB (DIN) Jack
Tape Input Output Terminals
AM Ferrite Bar Antenna
4CH Input Terminals
2CH input Terminals
AC Outlet
Ground Terminals
Speaker Terminals [B]
AC Line Protector
Pre Amp Output Main Amp Input Terminals
FM 300 ohm Antenna Terminal
Speaker Change Switch
FM 75 ohm Antenna Terminal
Speaker Terminals [A]
Protector
AM Antenna Terminal

2. DISASSEMBLIES


②
⑦
(TA-TC)
①
(TE-VL)
①
①
①
⑥
③
③
⑤
③
③
⑤
④
③
③
③
③
③
⑤
③


Chassis
⑧
Cabinet
⑦
Power Trans

Cabinet Removal (TA-TC)

TE-VL MODEL

2-1 CABINET REMOVAL

1. Remove four screws (①).
2. Pull out the Cabinet (②).

2-2 BOTTOM COVER REMOVAL

1. Remove ten screws (③).
2. Pull out the Bottom Plate (④).

2-3 FRONT PANEL REMOVAL

1. Pull out all knobs.
2. Remove three screws (⑤).
3. Pull out the Panel (⑥).

TA-TC MODEL

2-4 BOTTOM COVER REMOVAL

1. Remove ten screws (③).
2. Pull out the Bottom Plate (④).

2-5 CABINET REMOVAL

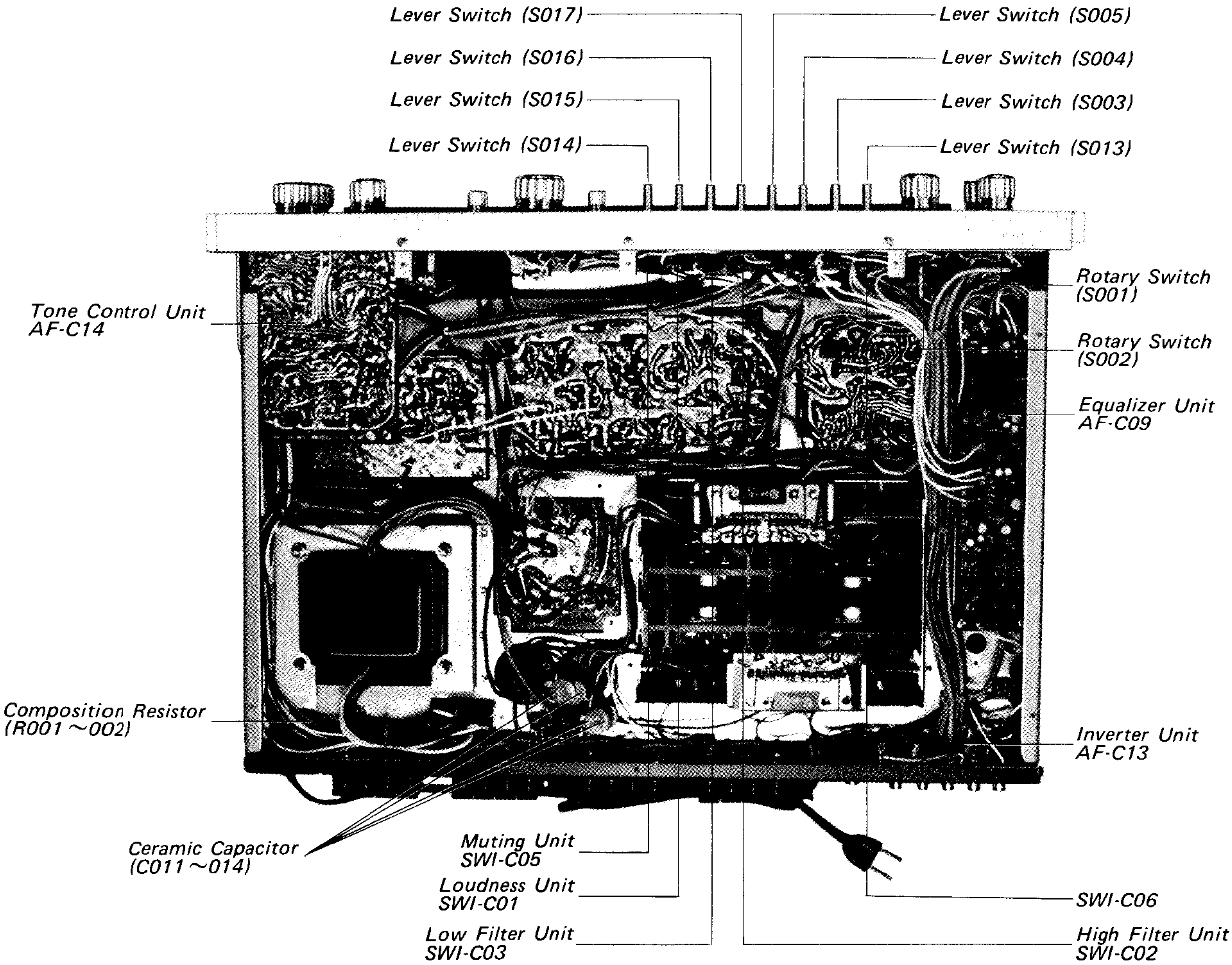
1. Remove three screws (①) and a nut (⑦).
2. Pull out the Cabinet.

2-6 FRONT PANEL REMOVAL

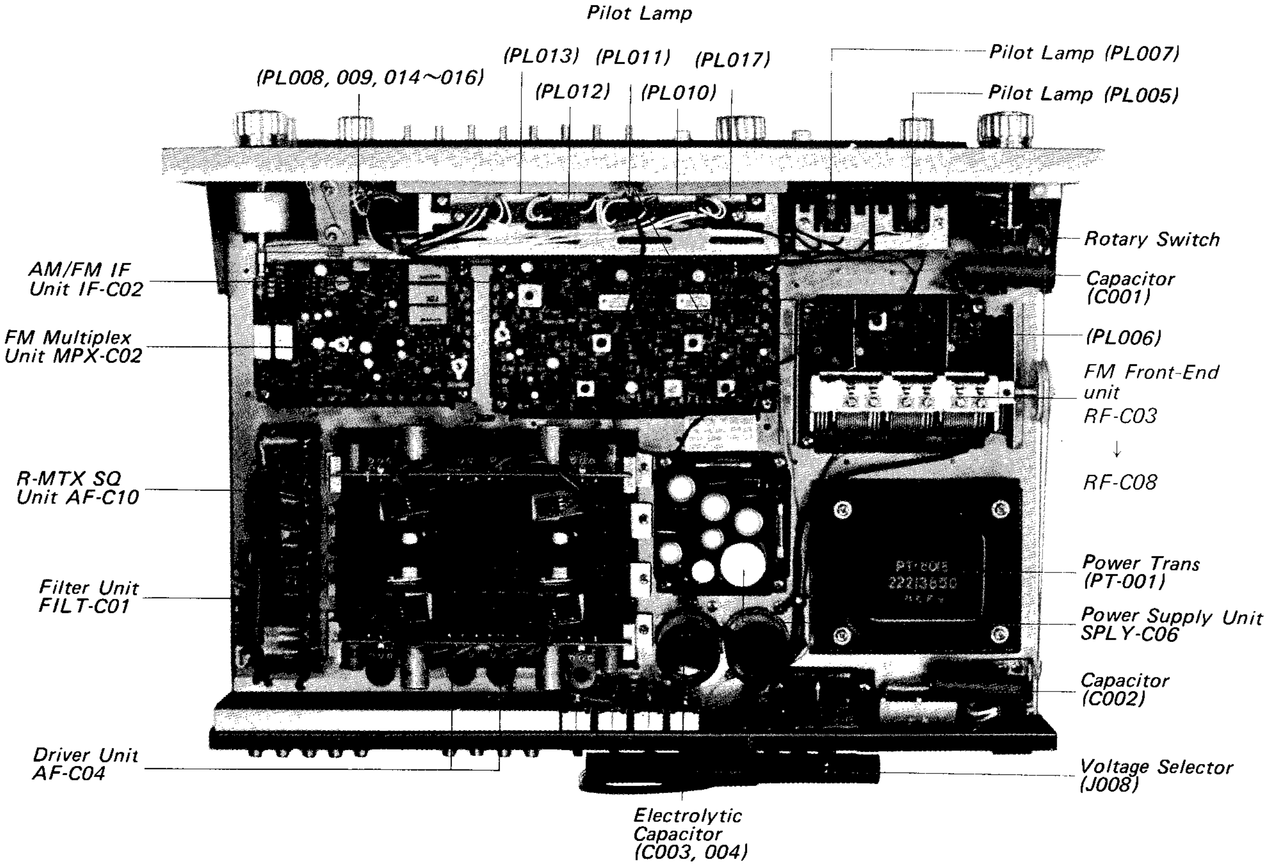
1. Pull out all knobs.
2. Remove three screws (⑤).
3. Pull out the Panel (⑥).

3. PARTS LOCATIONS

3-1 CHASSIS BOTTOM VIEW

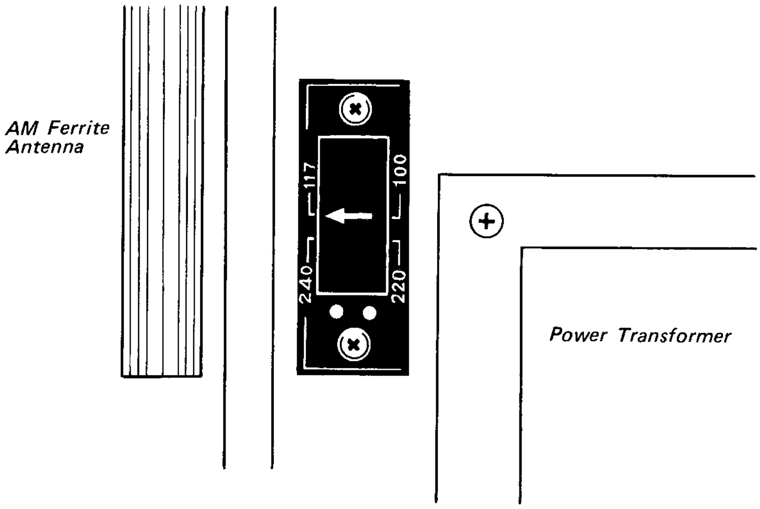

Lever Switch (S017)
Lever Switch (S016)
Lever Switch (S015)
Lever Switch (S014)
Lever Switch (S005)
Lever Switch (S004)
Lever Switch (S003)
Lever Switch (S013)
Tone Control Unit AF-C14
Rotary Switch (S001)
Rotary Switch (S002)
Equalizer Unit AF-C09
Composition Resistor (R001 ~002)
Inverter Unit AF-C13
Ceramic Capacitor (C011 ~014)
Muting Unit SWI-C05
Loudness Unit SWI-C01
Low Filter Unit SWI-C03
SWI-C06
High Filter Unit SWI-C02

3-2 CHASSIS TOP VIEW


Pilot Lamp
(PL008, 009, 014~016)
(PL013)
(PL011)
(PL017)
(PL012)
(PL010)
Pilot Lamp (PL007)
Pilot Lamp (PL005)
Rotary Switch
AM/FM IF Unit IF-C02
Capacitor (C001)
FM Multiplex Unit MPX-C02
(PL006)
FM Front-End unit RF-C03 ↓ RF-C08
R-MTX SQ Unit AF-C10
Filter Unit FILT-C01
Power Trans (PT-001)
Power Supply Unit SPLY-C06
Capacitor (C002)
Driver Unit AF-C04
Voltage Selector (J008)
Electrolytic Capacitor (C003, 004)

3-3 VOLTAGE ADJUSTMENT

Insert the pin, adjusting the arrow in the direction of the power supply voltage applied.


AM Ferrite Antenna
117
100
240
220
Power Transformer

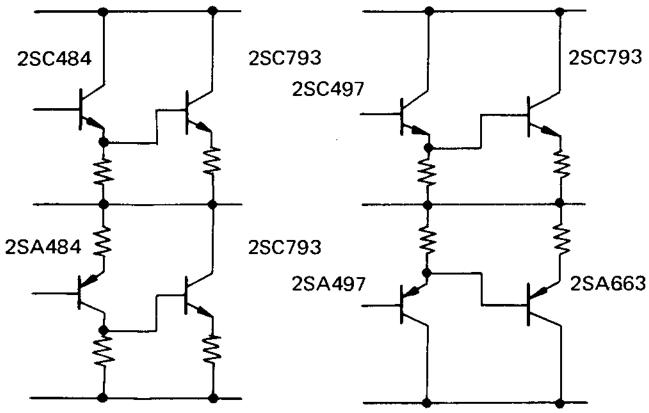
4. TECHNICAL POINTS

1. PURE COMPLEMENTARY CIRCUIT SYSTEM

The difference between the Pure Complementary Circuit and the Quasi Complementary Circuit is that the Darlington connections in the lower part are, as shown in the figure below, connected to PNP-NPN for the Quasi Complementary Circuit and to PNP-PNP for the Pure Complementary Circuit. This difference results in the cross-over distortion in the unit. Although the switching distortion is inevitable with B class P-P amplifier, the Pure Complementary Circuit, where both upper and lower transistors are symmetrical each other, these distortions are canceled each other and the action similar to A class action is provided.

This can be afforded only with the newly developed PNP transistors, 2SA663, which are produced by the Toshiba's semiconductor manufacturing technology.

The distortion can be kept under 0.1% even with 10kHz at rated output and PBW is also greatly improved with the use of this transistor.



Quasi Complementary Circuit
(SA-20, SA-15)

Pure Complementary Circuit
(SA-500, SA-504)

2. DIRECT-COUPLING OUTPUT CAPACITOR LESS CIRCUIT SYSTEM

The following features are available by adopting the Output Capacitor Less of the direct-coupling two-power source system:

(1) Stable extension of frequency characteristic to the ultra low frequency range becomes possible.

(2) The output impedance (Damping Factor) does not vary even in the ultra low frequency range.

This feature together with the Pure Complementary Circuit system mentioned above is regarded as the one for the most ultimate and perfect amplifier today.

The most serious problems with the direct-coupling amplifier are the DC drift due to the temperature variation and the possibility of the occurrence of excess direct current to the speaker, which is caused by the transient shock at the moment of switching on the power supply and the unlikely break of the power transistors. In the model SA-504, these problems are resolved in such ways as follows: A differential amplifier consisting of the transistors of high current amplification factor, HFE, is incorporated in this unit in order to raise its DC stability. This shock at the moment of supply of power is reduced to some extent by inserting the twin-T type filter in the unit.

The speaker is safely protected against unlikely accident of transistor break by incorporating the circuit breaker between the speaker terminal and output circuit. On the contrary, in the case of shorting of the speaker terminal, the output circuit is protected by the circuit breaker built-in.

3. BUILT-IN SPECIAL AMPLIFIER FOR CONDENSER-CARTRIDGE

There are two types of cartridge, the velocity proportional type (MM, MC, etc.) and the amplitude proportional type (photoelectric cartridge, etc.).

The condenser-cartridge belongs to the latter type and a special correction curve different from the conventional one is necessary. The power for the ICs in the cartridge is supplied through the ground of the input terminal R channel. This amplifier can be directly connected with the condenser-cartridge (This is not the case for the photoelectric cartridge).

4. BTL CIRCUIT

When the four channel amplifier is used for reproduction with two speakers, this circuit is used in order to operate the four amplifiers effectively. The output voltage of two factors of magnitude can be supplied between the output terminals of each amplifier when the one speaker is operated in phase and the other out of phase with the use of the phase reverse circuit. Although the output power is theoretically of the four factors of magnitude from the relation, $(2V)^2/R = 4V^2/R$, that is in practice reduced to about two factors of magnitude due to losses such as the regulation of the transformer, the emitter resistance, etc.

5. MATRIX DECODER

All the two channel program sources (record, open reel, cassette, cartridge tape, FM broadcasting, etc.)

can be reproduced in the four channel fashion with the built-in MATRIX Decoder.

6. SQ

Fig. 1 shows signal components LT and RT recorded on SQ record disc. Decoder shown in Fig. 1-b changes composite two-channel signals into four-channel stereo signals FL, RL, FR and RR. Such a decoder produces sound field extended in right and left directions but not so extended in front and rear directions.

To improve front and rear channel separation, SQ decoder mixes LT and RT signals in proper proportion as shown in Fig. 2.

Note: *14 dB between front left and front right 'channels.
*6 dB between front and rear channels.
*6 dB between rear left and rear right channels.

Matrix circuits shown in Fig. 3-a, 3-b, 3-c and 3-d mixes LT + 0.2RT, RT + 0.2LT, LT - 0.4RT and RT - 0.4LT signals respectively. TR04, TR03, TR06 and TR05 amplifies signals attenuated by matrix circuits.

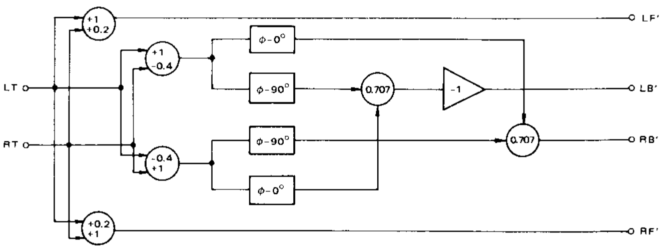
Circuit shown in Fig. 4-a has a phase characteristic in Fig. 4-b. Low Frequency signal output is almost the same phase as the input. As frequency becomes higher, output phase negatively shifts. Combination of such two circuits, one shifts 90 degrees at F1 and the other 90 degrees at F2, makes 90 degrees phase difference in some range. This circuit is called phase-shifter.

RL' and RR' signals are mixed through phase-shifter in Fig. 5-a and 5-b and amplified by TR09 and TR07 respectively to set the levels.

7. R-MTX

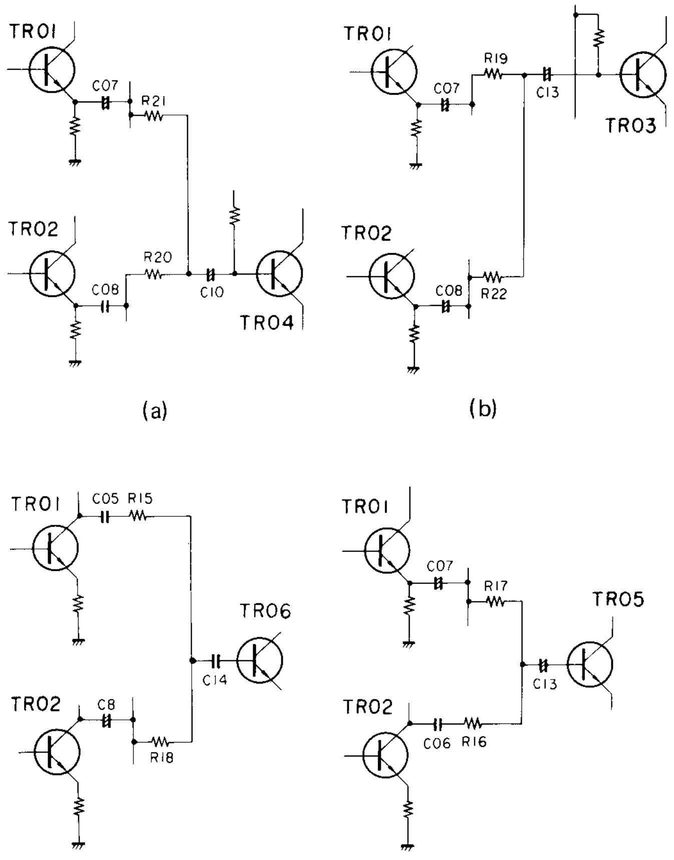
R-MTX circuit mixes front-left and front-right signals in the same proportion as SQ to improve front and rear channel separation.

Rear channel signals are mixed in the proportions such as RR = R - 0.4L and RL = L - 0.4R as shown in Fig. 6.


LT
RT
+1
+0.2
+1
-0.4
-0.4
+1
+0.2
+1
φ-0°
φ-90°
φ-90°
φ-0°
0.707
-1
0.707
LF'
LB'
RB'
RF'

80° ~ 100° phase difference at approx. 100 ~ 760 Hz

Fig. 2


TR01
C07
R21
TR02
R20
C08
C10
TR04
TR01
R19
C07
C13
TR03
TR02
C08
R22
TR01
C05 R15
TR06
C14
TR02
C8
R18
TR01
C07
R17
TR05
C13
TR02
C06 R16

(a) (b) (c) (d)

Fig. 3

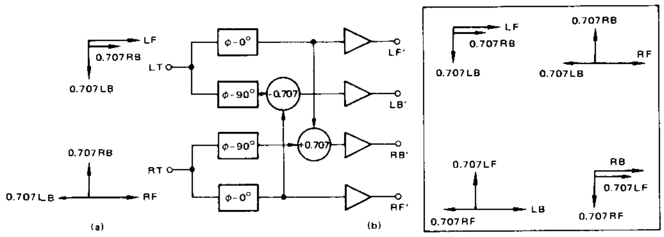
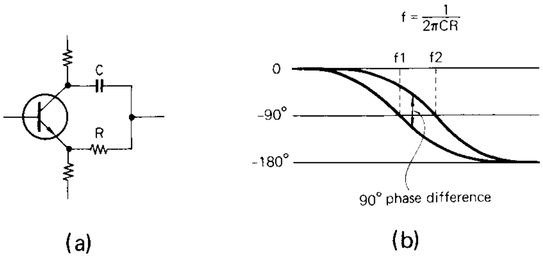
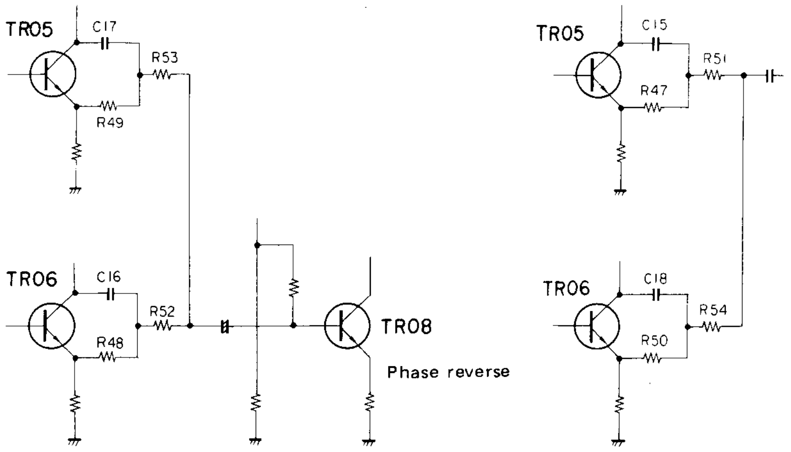

LF
0.707RB
0.707LB
0.707RB
RF
0.707LB
LT
RT
φ-0°
φ-90°
0.707
φ-90°
0.707
φ-0°
LF'
LB'
RB'
RF'
(a)
(b)
LF
0.707RB
0.707LB
0.707RB
RF
0.707LB
0.707LF
LB
0.707RF
RB
0.707LF
0.707RF

Fig. 1


C
R
f = 1/2πCR
f1 f2
0
-90°
-180°
90° phase difference

(a) (b)

Fig. 4


TR05
C17
R53
R49
TR06
C16
R52
R48
TR08
Phase reverse
TR05
C15
R51
R47
TR06
C18
R54
R50

(a) (b)

Fig. 5

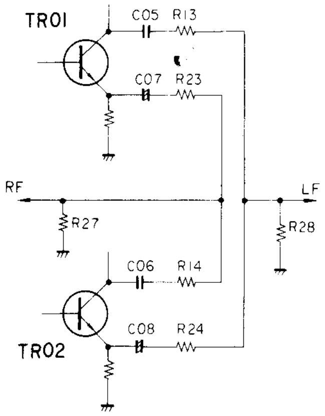

TR01
C05
R13
C07
R23
RF
R27
LF
R28
C06
R14
TR02
C08
R24

Fig. 6

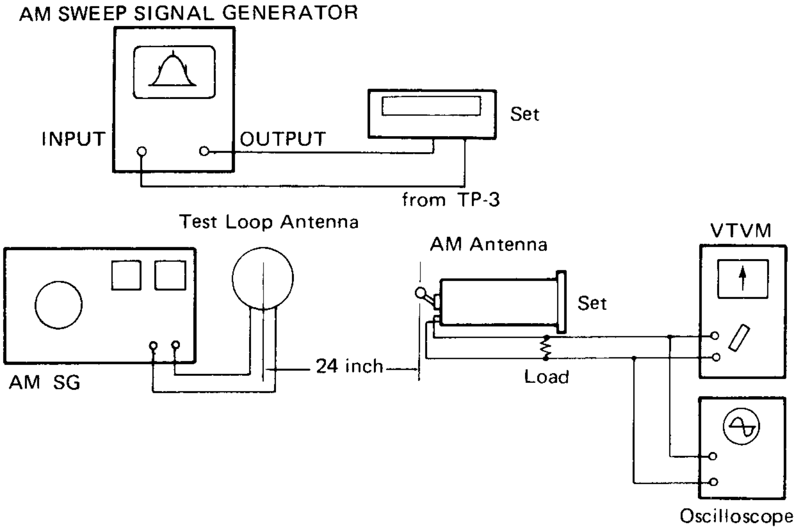
5. ADJUSTMENTS

5-1 AM TUNER ADJUSTMENT

Equipment:

1. SG (Signal Generator)
2. SG (Sweep Generator)
3. Test loop antenna (50 ohm)
4. Load (dummy load 8ohm or speaker 8ohm)
5. VTVM (AC)
6. Adjusting screw driver
7. Adjusting screw driver (use to antenna core)
8. Oscilloscope

AM ADJUSTMENT SET UP



Note 1. Make adjustment of the AM tuner section with the minimum input signal possible to the set.

Note 2. It is not always necessary to set the IF center frequency to 455kHz as its range is determined by the ceramic filter used. Center frequency is within 455 ±2kHz.

AM IF ADJUSTMENT PROCEDURE

STEP	ADJUSTMENT	REMARKS
IF Response	IF-C02 IT02, IT01 IF Transformer	Adjust for scope pattern with specified marker (455KHz) as illustrated in Fig

AM ADJUSTMENT PROCEDURE

Adjust the tuning gang to be able to deflect from 0 through 100 indication on the meter.

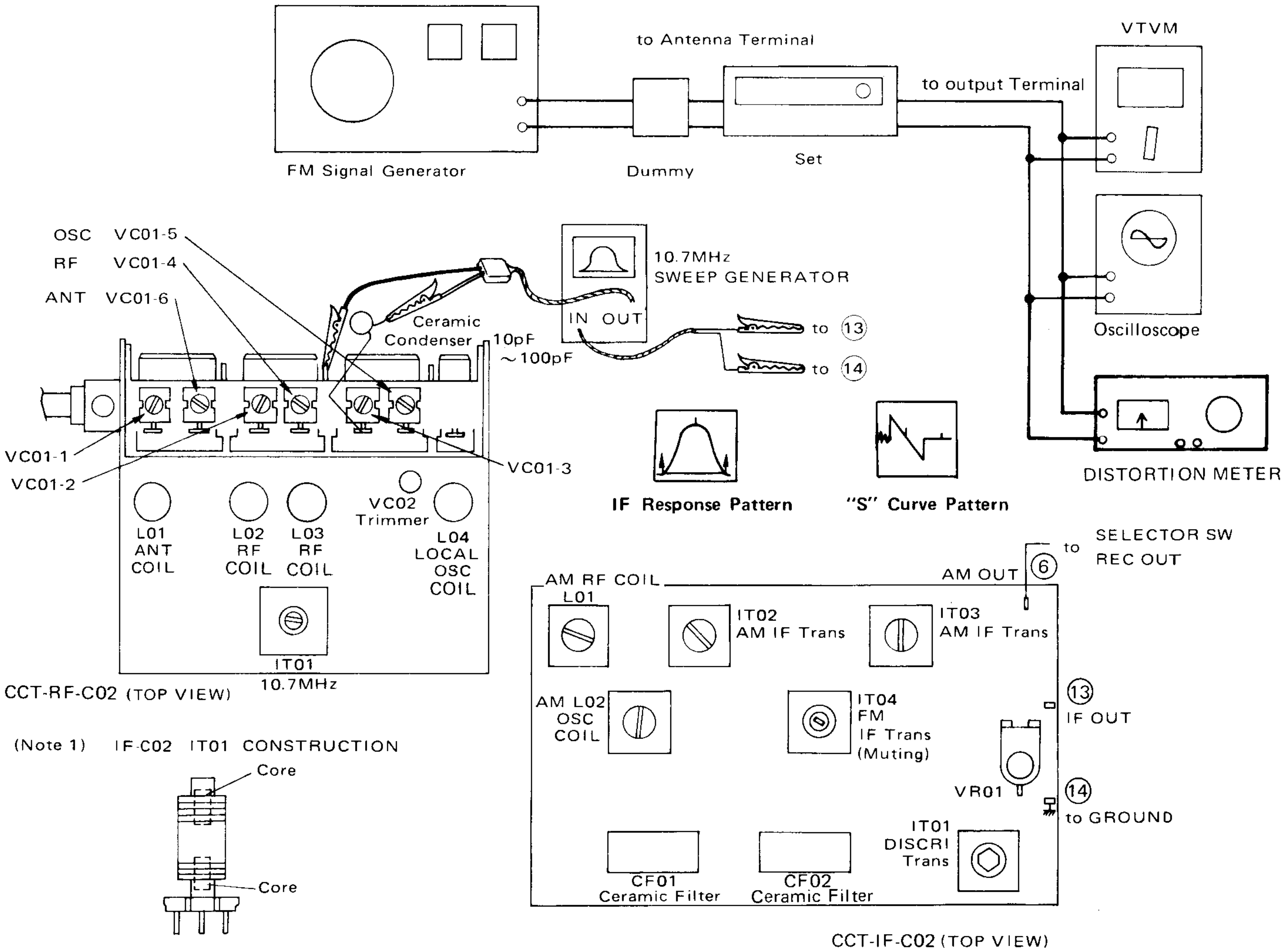
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	POSITION OF TUNING GANG	METERS	ADJUSTMENT	REMARKS
1	Connect loop antenna to signal generator and 24 inch away from the ferrite antenna.					
2	Loop antenna	540kHz	Set the tuning gang at 540kHz.	Connect to output terminals	CCT-IF-C02 L02 (OSC)	Adjust for max deflection on VTVM.
3	same	1600kHz	Set the tuning gang at 1600kHz.	same	CCT-RF-C03 VC01-5 (Trimmer)	same
4	Repeat steps 3 and 4 until no further improvement is noticed.					
5	Loop antenna	1400kHz	1400kHz	Connect to output terminals	CCT-RF-C03 VC01-4, VC01-6 (Trimmer)	Adjust for max deflection on VTVM.
6	same	600kHz	600kHz	same	CCT-IF-C02 L01 (RF) L001 (Ferrite Antenna)	same
7	Repeat steps 5 and 6 until no further improvement is attained					

5-2 FM TUNER ADJUSTMENT

Equipment:

1. SG (Signal Generator)
2. SG (Sweep Marker Generator)
3. Dummy Antenna
4. Load (dummy load 8ohm or speaker 8ohm)
5. VTVM (AC)
6. Adjusting driver
7. Oscilloscope
8. Distortion meter

FM ADJUSTMENT SETUP


FM Signal Generator
Dummy
to Antenna Terminal
Set
to output Terminal
VTVM
Oscilloscope
DISTORTION METER
10.7MHz
SWEEP GENERATOR
IN OUT
to ⑬
to ⑭
Ceramic
Condenser
10pF
~100pF
OSC VC01-5
RF VC01-4
ANT VC01-6
VC01-1
VC01-2
VC01-3
VC02
Trimmer
L01
ANT
COIL
L02
RF
COIL
L03
RF
COIL
L04
LOCAL
OSC
COIL
IT01
10.7MHz
IF Response Pattern
"S" Curve Pattern
AM RF COIL
L01
AM OUT
⑥
to
SELECTOR SW
REC OUT
IT02
AM IF Trans
IT03
AM IF Trans
AM L02
OSC
COIL
IT04
FM
IF Trans
(Muting)
⑬
IF OUT
VR01
⑭
to GROUND
IT01
DISCRI
Trans
CF01
Ceramic Filter
CF02
Ceramic Filter
Core
Core

CCT-RF-C02 (TOP VIEW)

CCT-IF-C02 (TOP VIEW)

(Note 1) IF-C02 IT01 CONSTRUCTION

(Note 2) CF Marking

red	10.70MHz	black	10.64MHz
blue	10.67MHz	white	10.76MHz
orange	10.73MHz		

FM IF ADJUSTMENT PROCEDURE

STEP		ADJUSTMENT	REMARKS
1	IF Response	CCT-RF-C03 IT01, CCT-IF-C02 IT01 (lower) IF Transformers	Adjust for scope pattern with specified marker (10.7MHz) as illustrated in Fig. Note 1. Keep the upper core of IF C02 IT01 in the top position. Note 2. Set the semi-fixed volume of IF C02 VR01 to the mid-position.
2	"S" Curve	CCT-IF-C02 IT01 Detector	Adjust for symmetrical "S" curve as illustrated in Fig.

FM RF ADJUSTMENT PROCEDURE

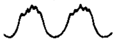
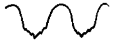
Adjust the tuning gang to be able to deflect from 0 through 100 indication on the meter.

STEP	GENERATOR FREQUENCY	POSITION OF TUNING GANG	ADJUSTMENT	REMARKS
1	88MHz	Set the tuning gang at 88MHz.	CCT-RF-C03 L04 (Local Osc.)	Adjust for maximum deflection on VTVM
2	108MHz	Set the tuning gang at 108MHz.	CCT-RF-C03 VC02 (Trimmer)	as Step 1
3	88MHz	88MHz	CCT-RF-C03 L01 (Ant Coil) L02 (RF Coil) L03 (RF Coil)	as Step 1
4	108MHz	108MHz	CCT-RF-C03 VC01-1 VC01-2 VC01-3	as Step 1
5	Repeat steps 3 and 4 until no further improvement is attained.			

Note:
The Receiver Frequency Range should not be below 87.5 MHz owing to the FTZ regulation.

If the above condition were not satisfied, adjust the Local Oscillator Coil L04 at the FM front end by turning it in the clockwise direction.

FM DISTORTION ADJUSTMENT

1. Set the SG at 98 MHz (400 Hz 100% modulation), output 60 dB.
2. Connect it to the antenna terminal of the set and tune in 98 MHz signal.
3. Increase and decrease the SG frequency for output waveforms, upper clip  and lower clip , respectively, and measure the SG frequencies (f_1 and f_2) obtained.
   Set the SG at the frequency $\frac{f_1 + f_2}{2}$
4. Adjust the discrete transformer T01 upper and lower cores of Unit PCB CCT-IF-C02 to obtain the minimum distortion value.

FM TUNING METER ADJUSTMENT

1. This adjustment should be made immediately after the FM distortion adjustment.
2. Adjust VR01 of CCT-IF-C02 so that the tuning gang remains in the mid-position on the meter.
3. Check the distortion value again. If still maladjusted, readjust the cores of IT01, monitoring on the tuning meter.

FM MUTING ADJUSTMENT

1. Set the SG at 98 MHz, output 60 dB.
2. Connect it to the antenna terminal of the set and tune in 98 MHz.
3. Adjust IT04 of Unit PCB CCT-IF-C02 so that the maximum DC voltage can be obtained at TP-6. Never leave VR01 of CCT-MPX-C02 fully turned to the clockwise direction during this operation.

5-3 FM MPX ADJUSTMENT

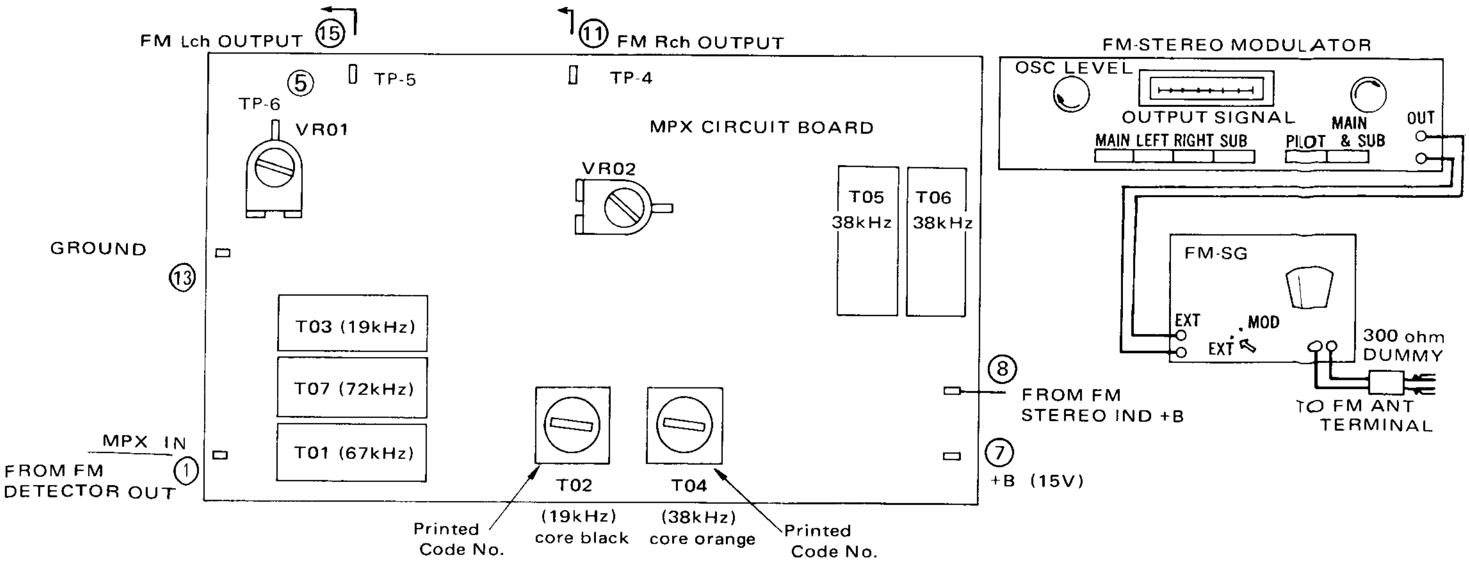
Equipment:

1. FM Sighal Generator
2. FM Stereo Modulator
3. VTVM (AC)
4. Oscilloscope

FM STEREO MULTIPLEX ADJUSTMENT PROCEDURE

	ITEM	STEP	GENERATOR	REMARKS
1	19kHz Trap 67kHz, 72kHz SCA Rejection 38kHz Trap			None Adjust 19kHz T03 67kHz T01, 72kHz T07 38kHz T05, T06.
2	19kHz, 38kHz AMP	1	For adjustment set-up, see Fig.	
		2	Connect VTVM to TP-4 (or TP-5) or REC OUT.	
		3	FMSG 98MHz INPUT 60dB 19kHz 10% modulation sub channel 45% modulation	Adjust T02 (19kHz Transformer) to T04 (38kHz Transformer). obtain maximum VTVM deflection.
3	Separation Control	1	For adjustment set-up, see Fig.	
		2	Connect VTVM to TP-4 (Rch) or REC OUT (R).	
		3	FM SG 98MHz INPUT 60dB 19kHz 10% modulation (L+R) + 19kHz 30% modulation L=R=400Hz or 1kHz	
		4	Set right channel to zero.	Adjust T04 (38kHz Transformer) a little to obtain minimum VTVM deflection. Adjust VR02 to obtain good separation
		5	Connect VTVM to TP-5 or REC OUT (L).	
		6	Same as step 3	
		7	Set left channel to zero.	Same as step 4.
		8	Repeat steps 4 and 7.	

Note: Preset the semi-fixed resistor VR02 to the midposition.


FM Lch OUTPUT ⑮
⑪ FM Rch OUTPUT
⑤ TP-5
TP-4
TP-6
VR01
MPX CIRCUIT BOARD
VR02
T05 38kHz
T06 38kHz
GROUND
⑬
T03 (19kHz)
T07 (72kHz)
T01 (67kHz)
MPX IN
FROM FM DETECTOR OUT ①
T02
T04
(19kHz) core black
(38kHz) core orange
Printed Code No.
Printed Code No.
⑧ FROM FM STEREO IND +B
⑦ +B (15V)
FM-STEREO MODULATOR
OSC LEVEL
OUTPUT SIGNAL
MAIN LEFT RIGHT SUB
PILOT
MAIN & SUB
OUT
FM-SG
EXT
MOD
EXT
300 ohm DUMMY
TO FM ANT TERMINAL

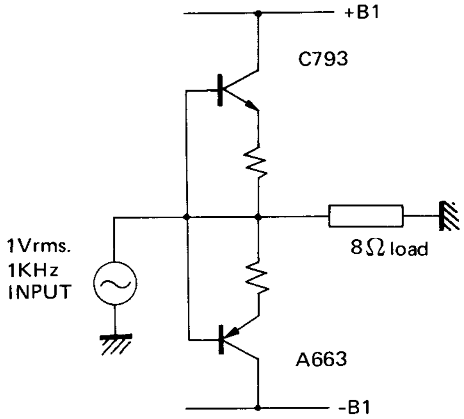
6. TROUBLE SHOOTING HINTS

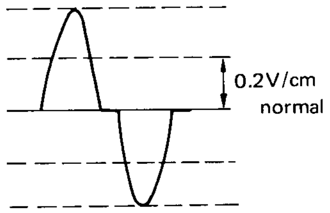
How to examine the output power transistors:

Step 1. Remove the driver unit (AF-C04) from the connector. Also TR13 and TR14 (2SC496) are to be removed.

Step 2. Measure the voltage at the speaker output terminal or terminals 13 & 14 using a tester, with the power switch on.
OV (± 0.3V) indication is normal.

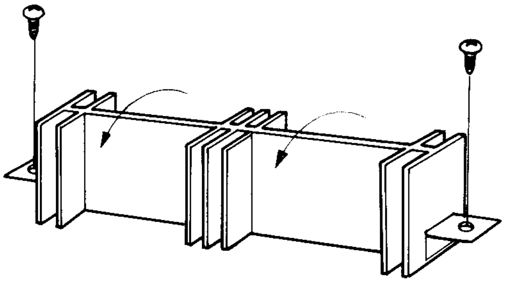
Step 3. Waveforms observation. Normal waveform illustrated below.



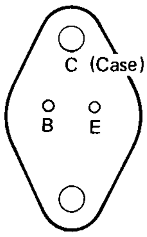


Replacement of defective power transistors:

Step 1. Remove the self-tap screws on both sides of the transistor and incline it forward as illustrated below.



Step 2. Remove the mounting screws securing the collector of the power transistor and pull out the transistor. (This is easily replaceable because TR socket is in use.)



How to examine the drive unit:

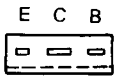
Note: If it is likely to break the power transistors during examination, disconnect the leads to the bases of 2SC793 and 2SA663.

Can one get correct mid-voltage?

Step 1. If OK .... Does the voltage between the collector and the emitter of TR13 or TR14 (2SC496) change with variation of VR03 or VR04 (500 ohm)? (1.9V-3.5V)

Step 2. OK .... Normal
Adjust IC idle by VR03, VR04 with power transistors connected.
NO .... 2SC496 is defective.

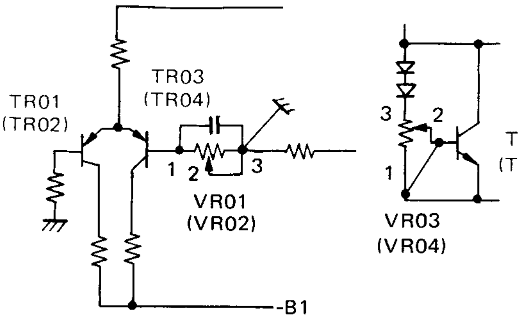
Step 3. If NOT .... If perfect adjustment to zero voltage is not possible (normally this is variable to both + and –, but in this case it is impossible), this is due to the rank difference between h_{FE}s of TR01/03 or TR02/04. Adjust the rank.



2SC496

Check if the correct mid-voltage is obtainable or not.

Step 4. Examine TR, removing TR09 and TR11 (TR10 and TR12).
(Note) In many cases one meets troubles with TR09 and TR11.



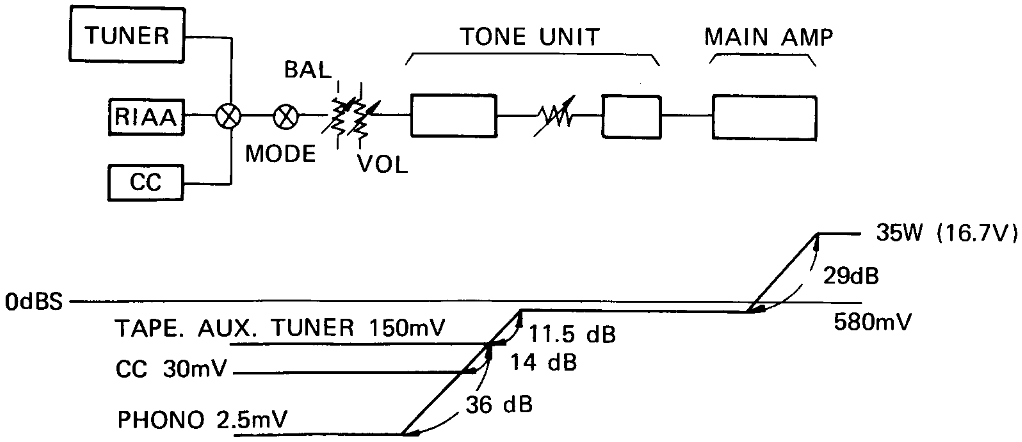
Step 5. As shown above, connect the terminal 3 of VR01 to the ground, where TR09 and TR11 are kept removed and VR01 fully turned to the terminal 3 side. Short-circuit the base with emitter.

Examine if collector voltage of TR05 (TR06) is adjustable to zero voltage with the power switch on.

If OK .... Examine if the voltage between collector and emitter of TR13 changes with variation of the semi-fixed VR03 (VR04) when the short-circuit between the base and the emitter of TR13 is released. (Step 1.)

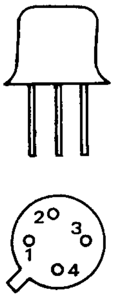
If NOT .... Check the transistors, TR01, TR03, TR05 and TR06.

7. LEVEL DIAGRAM


TUNER
RIAA
CC
BAL
MODE
VOL
TONE UNIT
MAIN AMP
35W (16.7V)
29dB
0dBS
580mV
TAPE. AUX. TUNER 150mV
11.5 dB
CC 30mV
14 dB
PHONO 2.5mV
36 dB

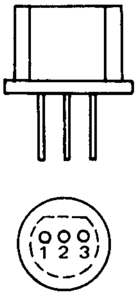
8. TRANSISTOR BASE DIAGRAMS

3SK35



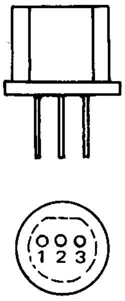
1. Drain
2. Gate 2
3. Gate 1
4. Source (Case)

2SA561
2SC373
2SC734
2SC785
2SC380A
2SC371
2SC372
2SC1000



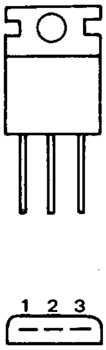
1. Emitter
2. Collector
3. Base

2SK19



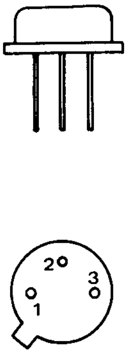
1. Drain
2. Source
3. Gate

2SD235



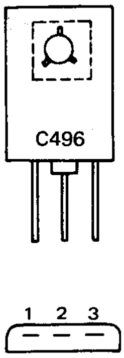
1. Base
2. Collector (Radiation Board)
3. Emitter

2SA497
2SC497



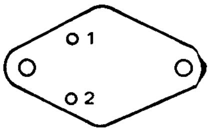
1. Emitter
2. Base
3. Collector (Case)

2SC496



1. Emitter
2. Collector
3. Base

2SA663
2SC793

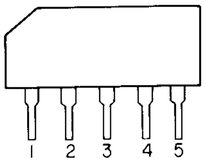


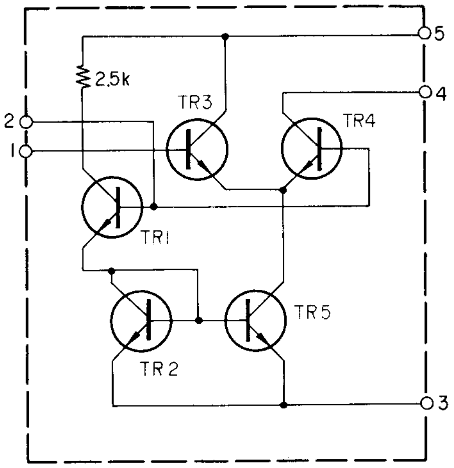
1. Emitter
2. Base
3. Case Collector

9. INTEGRATED CIRCUIT BASE DIAGRAM

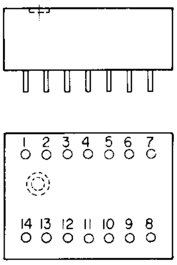
EQUALIZER CIRCUIT

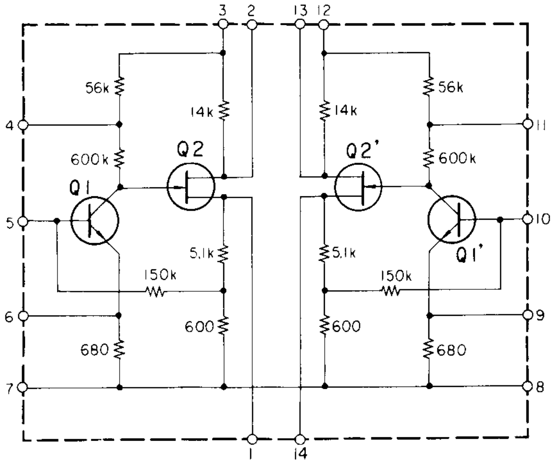
TA7060P



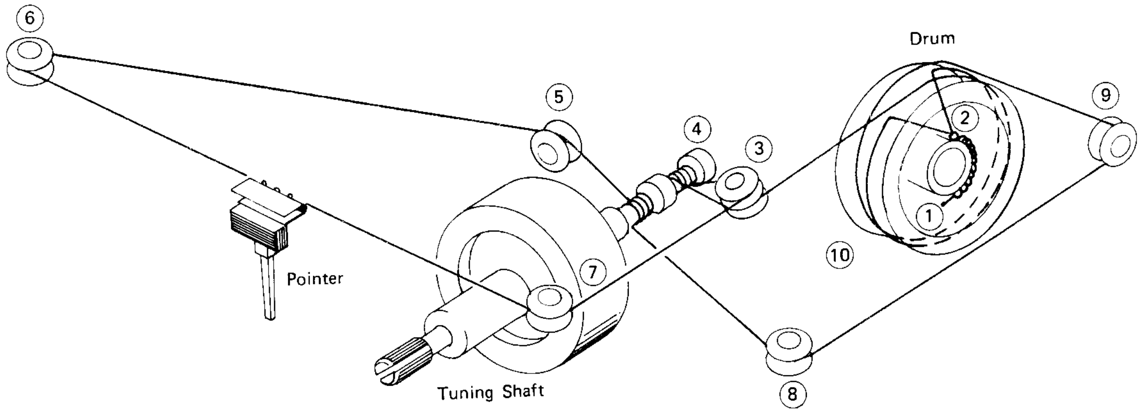

5
4
2.5k
TR3
TR4
2
1
TR1
TR5
TR2
3

TH9014P


1 2 3 4 5 6 7
14 13 12 11 10 9 8


3 2 13 12
56k
14k
14k
56k
4
11
600k
Q2
Q2'
600k
Q1
5
10
Q1'
5.1k
5.1k
150k
150k
6
9
600
600
680
680
7
8
1
14

10. DIAL STRINGING DIAGRAM

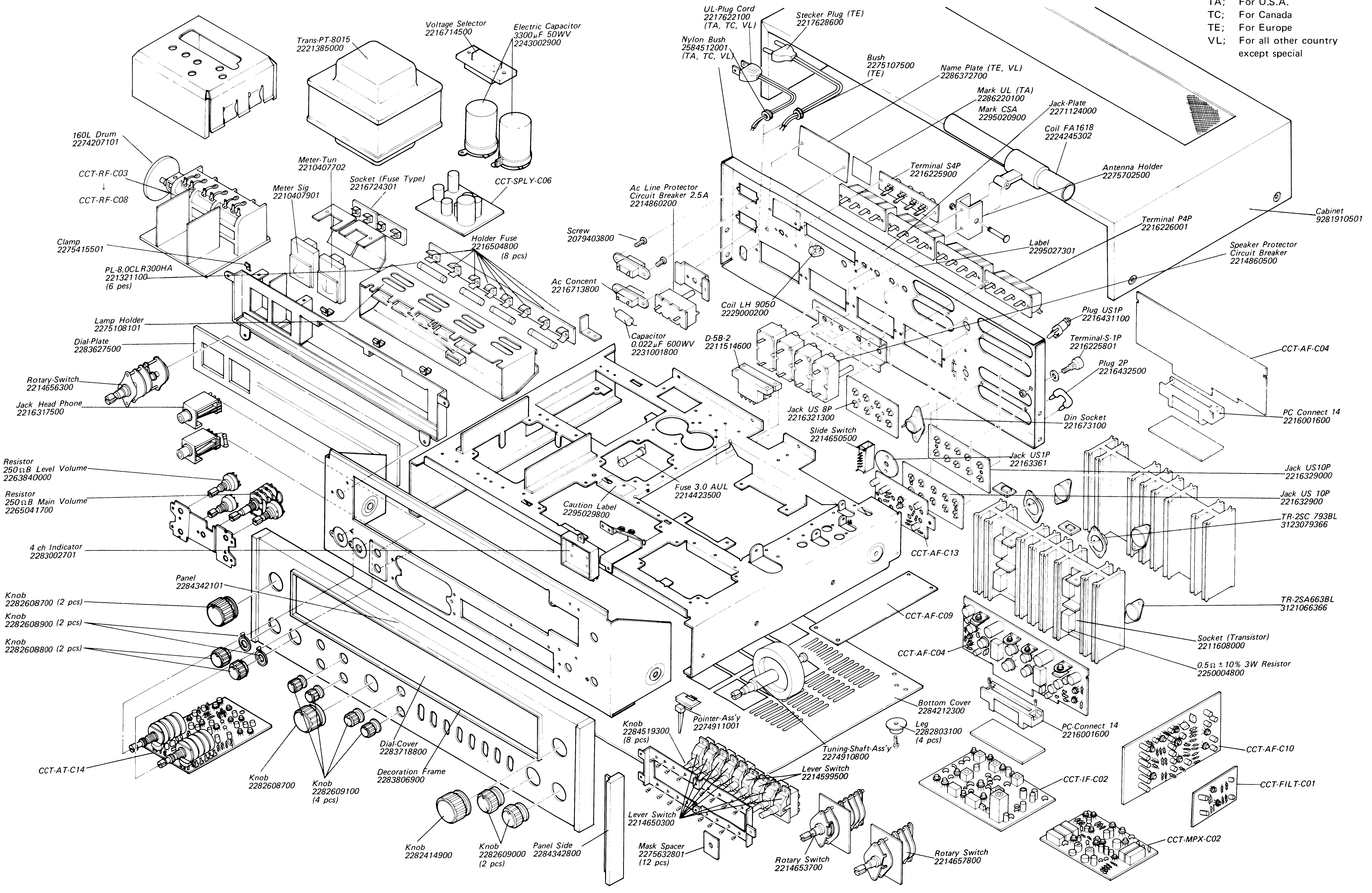

⑥
Drum
⑤
⑨
④
③
②
①
⑩
Pointer
⑦
Tuning Shaft
⑧

Dial Stringing Block Diagram

Load the dial cord as shown in the figure above. Get the cord through the eyelet as shown right.
Give tension on the dial cord by tension-spring action. Then squash the eyelet and fix it by the aid of a small amount of cement not to loosen the cord.

11. CABINET EXPLODED VIEW

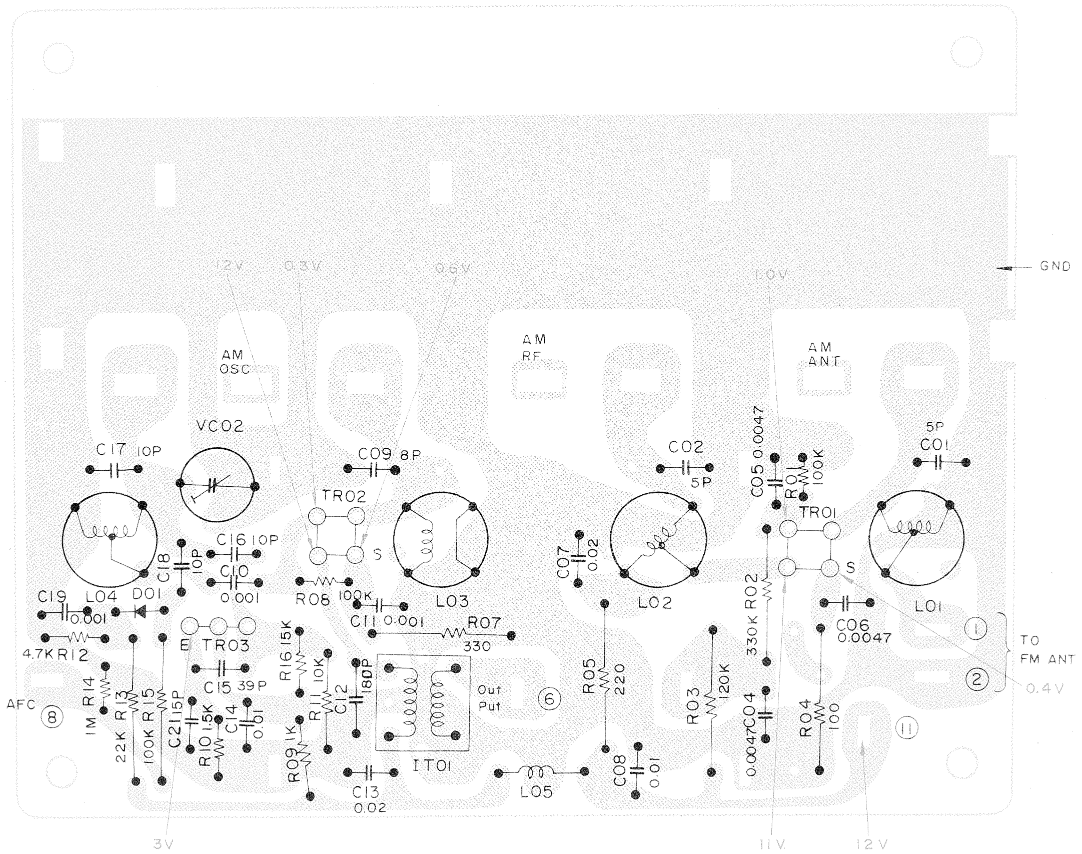
TA; For U.S.A.
TC; For Canada
TE; For Europe
VL; For all other country except special

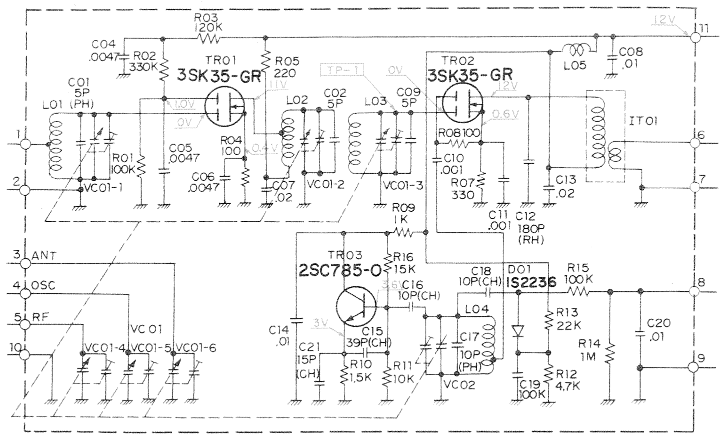

Trans-PT-8015
2221385000
Voltage Selector
2216714500
Electric Capacitor
3300μF 50WV
2243002900
UL-Plug Cord
2217622100
(TA, TC, VL)
Stecker Plug (TE)
2217628600
Nylon Bush
2584512001
(TA, TC, VL)
Bush
2275107500
(TE)
Name Plate (TE, VL)
2286372700
Mark UL (TA)
2286220100
Mark CSA
2295020900
Jack-Plate
2271124000
Coil FA1618
2224245302
Antenna Holder
2275702500
Cabinet
9281910501
Terminal S4P
2216225900
Terminal P4P
2216226001
Label
2295027301
Speaker Protector
Circuit Breaker
2214860500
160L Drum
2274207101
CCT-RF-C03
↓
CCT-RF-C08
Meter-Tun
2210407702
Meter Sig
2210407901
Socket (Fuse Type)
2216724301
CCT-SPLY-C06
Ac Line Protector
Circuit Breaker 2.5A
2214860200
Clamp
2275415501
Holder Fuse
2216504800
(8 pcs)
Screw
2079403800
PL-8.0CLR300HA
221321100
(6 pes)
Ac Concent
2216713800
Coil LH 9050
2229000200
Plug US1P
2216431100
Lamp Holder
2275108101
Capacitor
0.022μF 600WV
2231001800
D-5B-2
2211514600
Terminal-S-1P
2216225801
Dial-Plate
2283627500
Plug 2P
2216432500
CCT-AF-C04
Rotary-Switch
2214656300
Jack Head Phone
2216317500
Jack US 8P
2216321300
Din Socket
2216673100
PC Connect 14
2216001600
Slide Switch
2214650500
Jack US1P
22163361
Resistor
250ΩB Level Volume
2263840000
Jack US10P
2216329000
Resistor
250ΩB Main Volume
2265041700
Fuse 3.0 AUL
2214423500
Jack US 10P
221632900
Caution Label
2295029800
TR-2SC 793BL
3123079366
4 ch Indicator
2283002701
CCT-AF-C13
Panel
2284342101
Knob
2282608700 (2 pcs)
TR-2SA663BL
3121066366
Knob
2282608900 (2 pcs)
CCT-AF-C09
Knob
2282608800 (2 pcs)
CCT-AF-C04
Socket (Transistor)
2211608000
0.5Ω ± 10% 3W Resistor
2250004800
Bottom Cover
2284212300
Pointer-Ass'y
2274911001
Knob
2284519300
(8 pcs)
Leg
2282803100
(4 pcs)
PC-Connect 14
2216001600
Tuning-Shaft-Ass'y
2274910800
CCT-AF-C10
CCT-AT-C14
Dial-Cover
2283718800
Lever Switch
2214599500
CCT-IF-C02
CCT-FILT-C01
Knob
2282608700
Knob
2282609100
(4 pcs)
Decoration Frame
2283806900
Lever Switch
2214650300
CCT-MPX-C02
Mask Spacer
2275632801
(12 pcs)
Rotary Switch
2214657800
Knob
2282414900
Knob
2282609000
(2 pcs)
Panel Side
2284342800
Rotary Switch
2214653700

13. PRINTED CIRCUIT DIAGRAMS

This PC Board had been changed as right-hand side figure.

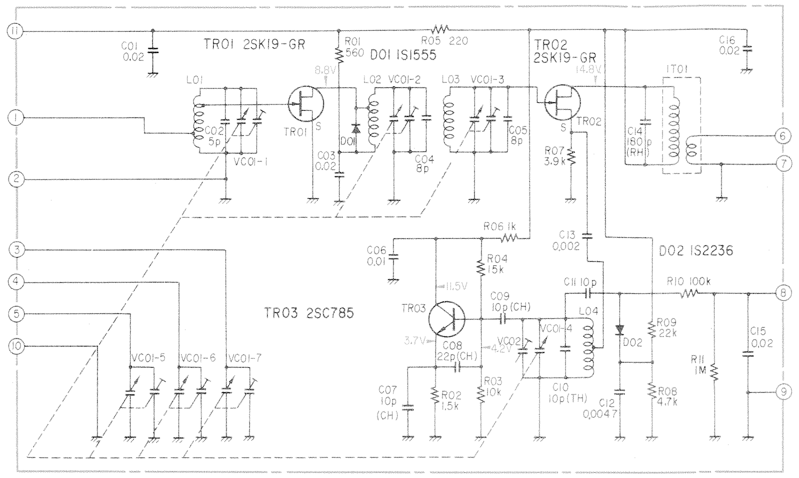
FM FRONT-END CIRCUIT BOARD (CCT-RF-C03)


GND
AM OSC
AM RF
AM ANT
12V
0.3V
0.6V
1.0V
VC02
C17 10P
C09 8P
TR02
C02 5P
C05 0.0047
R01 100K
TR01
5P C01
C16 10P
C18 10P
C10 0.001
C19 0.001
L04
D01
R08 100K
L03
C11 0.001
R07 330
C07 0.02
L02
R02 330K
C06 0.0047
L01
TO FM ANT
0.4V
4.7K R12
TR03
R16 15K
C15 39P
AFC
IM R14
22K R13
100K R15
C21 15P
C14 0.01
R10 1.5K
R11 10K
R09 1K
C12 180P
Out Put
IT01
C13 0.02
L05
R05 220
C08 0.01
R03 120K
C04 0.0047
R04 100
3V
11V
12V

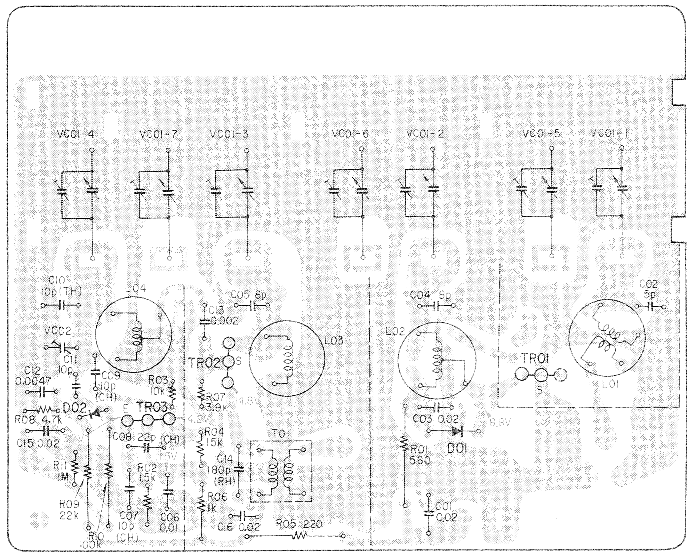

R03 120K
C04 .0047
R02 330K
TR01 3SK35-GR
R05 220
TR02 3SK35-GR
L05
C08 .01
12V
C01 5P
L01 (PH)
R01 100K
C05 .0047
R04 100
C06 .0047
L02
C02 5P
L03
C09 5P
C07 .02
VC01-1
VC01-2
VC01-3
R06 100
C10 .001
R07 330
IT01
C13 .02
R09 1K
C11 .001
C12 180P (RH)
ANT
OSC
RF
VC01
VC01-4
VC01-5
VC01-6
TR03 2SC785-O
R16 15K
C16 10P(CH)
C18 10P(CH)
D01 1S2236
R15 100K
L04
R13 22K
R14 1M
C20 .01
C14 .01
C21 15P (CH)
C15 39P(CH)
R10 1.5K
R11 10K
C17 10P (PH)
VC02
C19 100K
R12 4.7K

FM FRONT END UNIT (CCT-RF-C08)

SCHEMATIC DIAGRAM


C01 0.02
TR01 2SK19-GR
R01 560
D01 1S1555
R05 220
TR02 2SK19-GR
C16 0.02
IT01
L01
L02 VC01-2
L03 VC01-3
VC01-1
C02 5p
C03 0.02
C04 8p
C05 8p
R07 3.9k
C14 180p (RH)
R06 1k
C06 0.01
R04 15k
C13 0.002
D02 1S2236
TR03 2SC785
C09 10p (CH)
C11 10p
R10 100k
L04
VC01-4
C08 22p (CH)
R09 22k
R11 1M
C15 0.02
VC01-5
VC01-6
VC01-7
C07 10p (CH)
R02 1.5k
R03 10k
C10 10p (TH)
C12 0.0047
R08 4.7k

BOTTOM VIEW

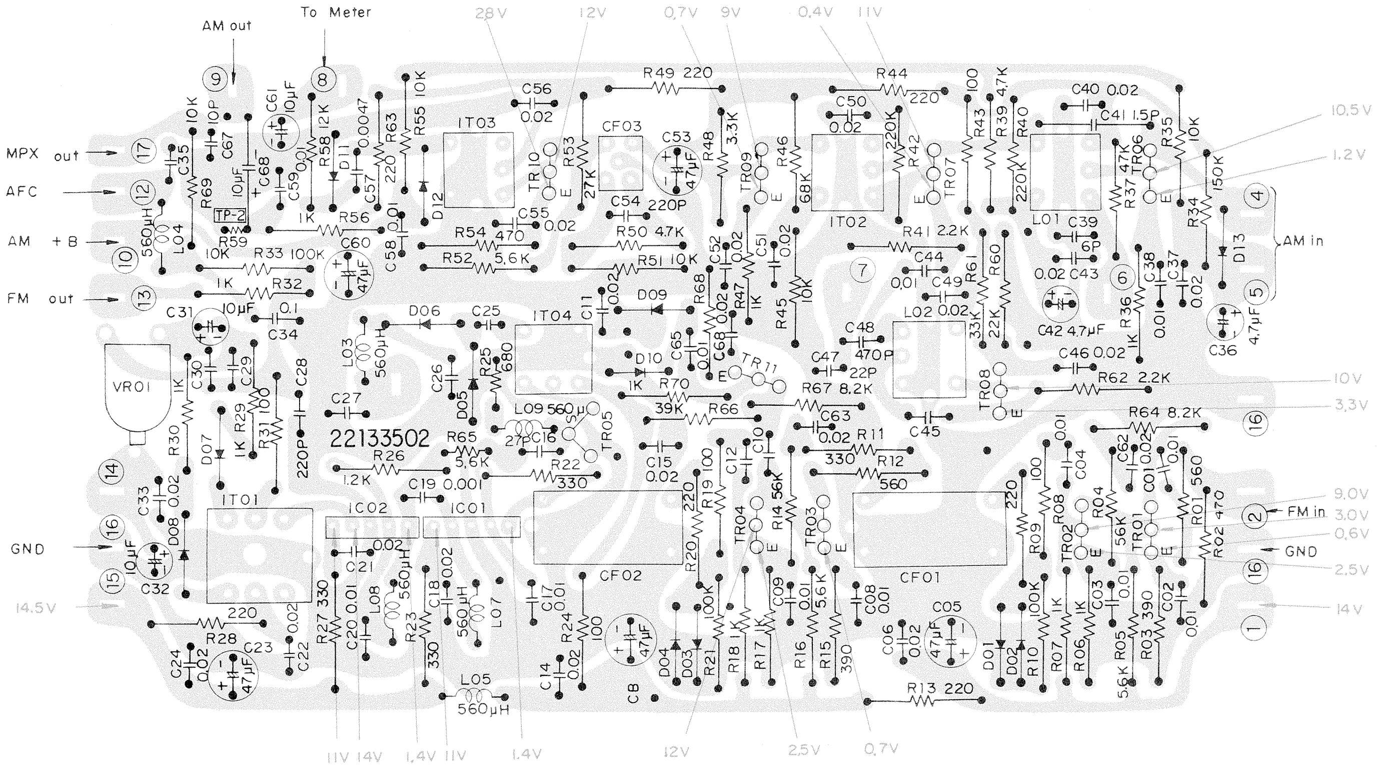

VC01-4
VC01-7
VC01-3
VC01-6
VC01-2
VC01-5
VC01-1
C10 10p (TH)
L04
VC02
C05 8p
C13 0.002
L03
C04 8p
L02
C02 5p
C12 0.0047
C11 10p
C09 10p (CH)
TR02
R03 10k
R07 3.9k
TR01
L01
D02
TR03
C03 0.02
R08 4.7k
C15 0.02
C08 22p (CH)
R04 15k
IT01
D01
R01 560
R11 1M
R02 1.5k
C14 180p (RH)
R06 1k
R09 22k
R10 100k
C07 10p (CH)
C06 0.01
C16 0.02
R05 220
C01 0.02

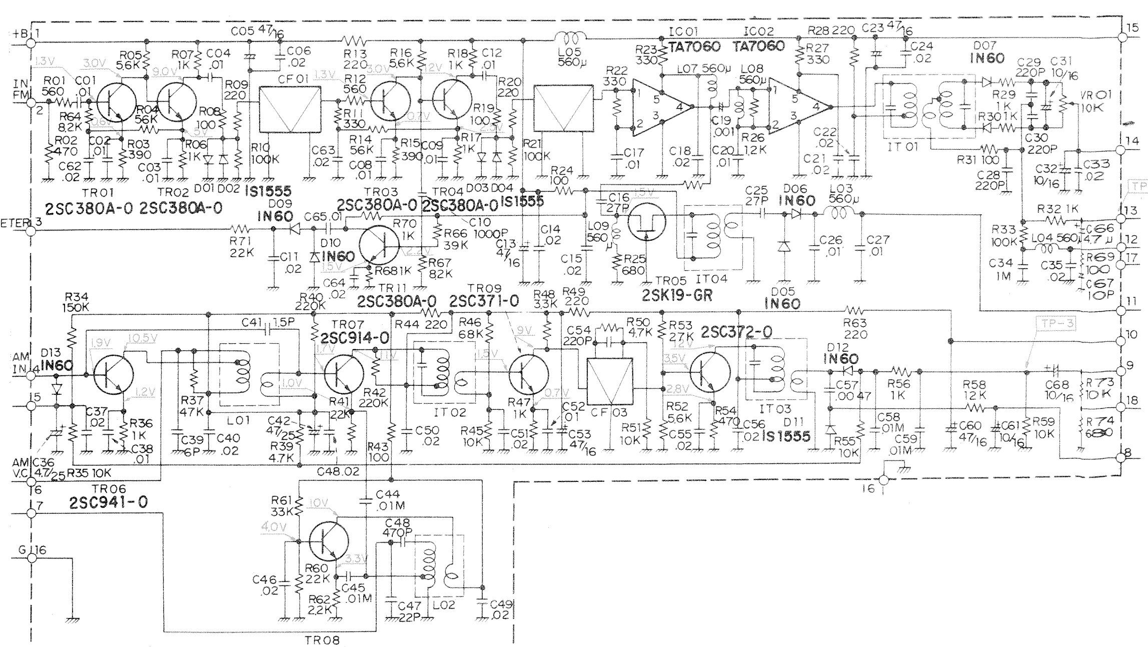
PARTS LIST

SYMBOL NO.	PART NO.	DESCRIPTION
SEMICONDUCTORS, COILS AND TRANSFORMER		
TR01,TR02		Transistor 2SK19-GR
TR03		Transistor 2SC785-0
D01		Diode 1S1555
D02		Diode 1S2236
L01	22292051	FM RF Coil RT81T
L02	22294242	FM RF Coil RT81T
L03	22294217	FM RF Coil RT8055
L04	22241009	FM RF Coil RT8057
IT01	22265655	IF Transformer IT6478
CAPACITORS		
C01,C03, C16,C15	22341222	Ceramic 50WV 0.022 μF
C02	22361509	Ceramic 50WV 5PFD
C04,C05	22361809	Ceramic 50WV 8PFD
C06	22341103	Ceramic 50WV 0.01 μF
C07,C09,C11	22360131	Ceramic 50WV 10PFJ
C08	22360134	Ceramic 50WV 22PFJ
C10	22360060	Ceramic 50WV 10PFJ
C12	22341472	Ceramic 50WV 0.0047 μF
C13	22341222	Ceramic 50WV 0.0022 μF
C14	22360242	Ceramic 50WV 180PFK
VC01	22307352	Variable Capacitor
VC02	22309108	Semifixed Capacitor
RESISTORS		
R01	22544561	Carbon 1/8W 560 Ω k
R02	22544152	Carbon 1/8W 1.5 kΩ k
R03	22544103	Carbon 1/8W 10 kΩ k
R04	22544153	Carbon 1/8W 15 kΩ k
R05	22544221	Carbon 1/8W 220 Ω k
R06	22544102	Carbon 1/8W 1 kΩ k
R07	22544392	Carbon 1/8W 3.9 kΩ k
R08	22544472	Carbon 1/8W 4.7 kΩ k
R09	22544223	Carbon 1/8W 22 kΩ k
R10	22544104	Carbon 1/8W 100 kΩ k
R11	22544105	Carbon 1/8W 1 μΩ k

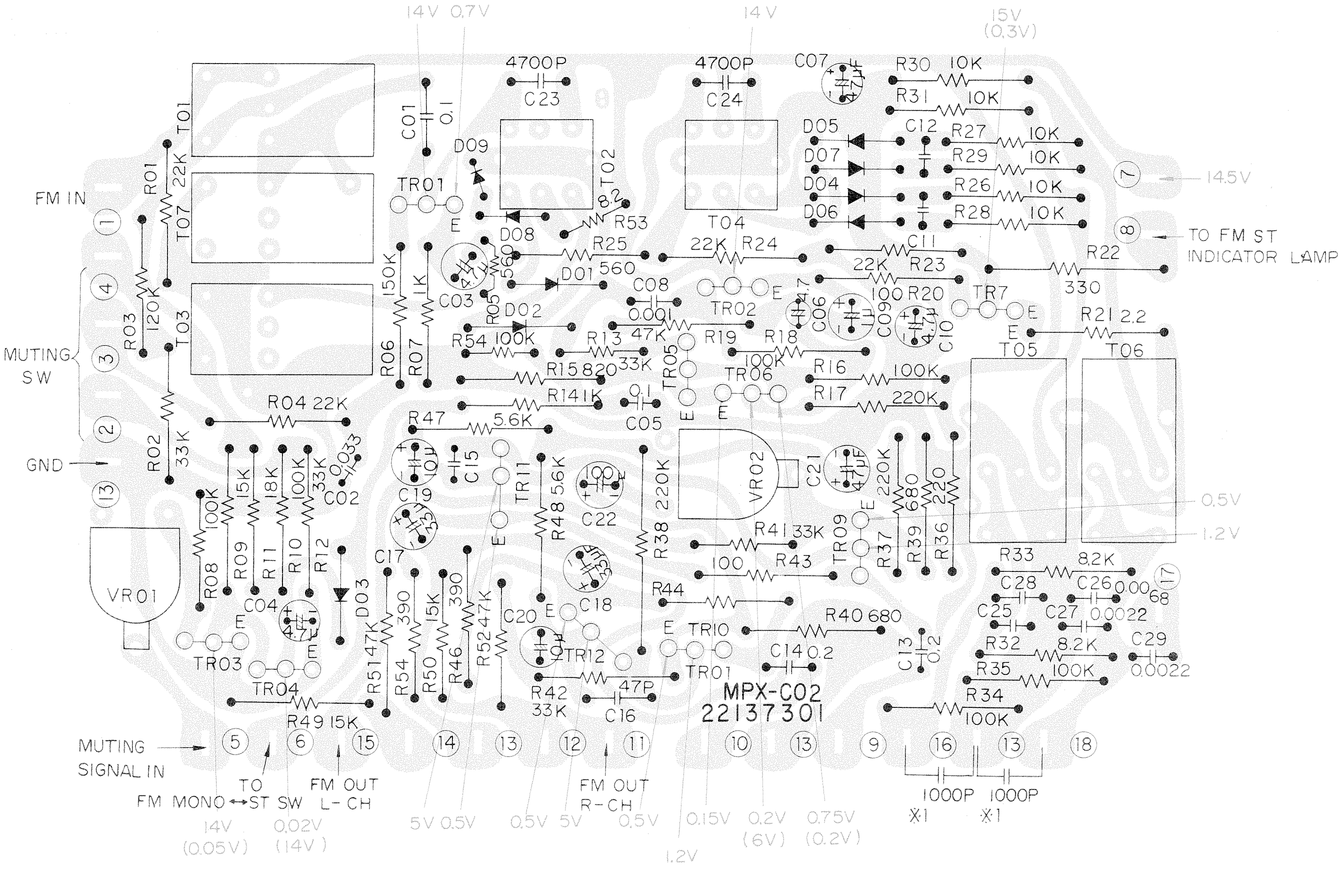
D = ± 1 pF J = ± 5 % K = ± 10 %

IF LIMIT CIRCUIT BOARD (CCT-IF-C02)


AM out
To Meter
MPX out
AFC
AM +B
FM out
GND
AM in
FM in
VR01
22133502
IT01
IT02
IT03
IT04
IC01
IC02
CF01
CF02
CF03
L01
L02
TP-2
28V
12V
0,7V
9V
0,4V
11V
10,5V
1,2V
10V
3,3V
9,0V
3,0V
0,6V
2,5V
14V
14,5V
11V 14V
1,4V 11V
1,4V
12V
2,5V
0,7V

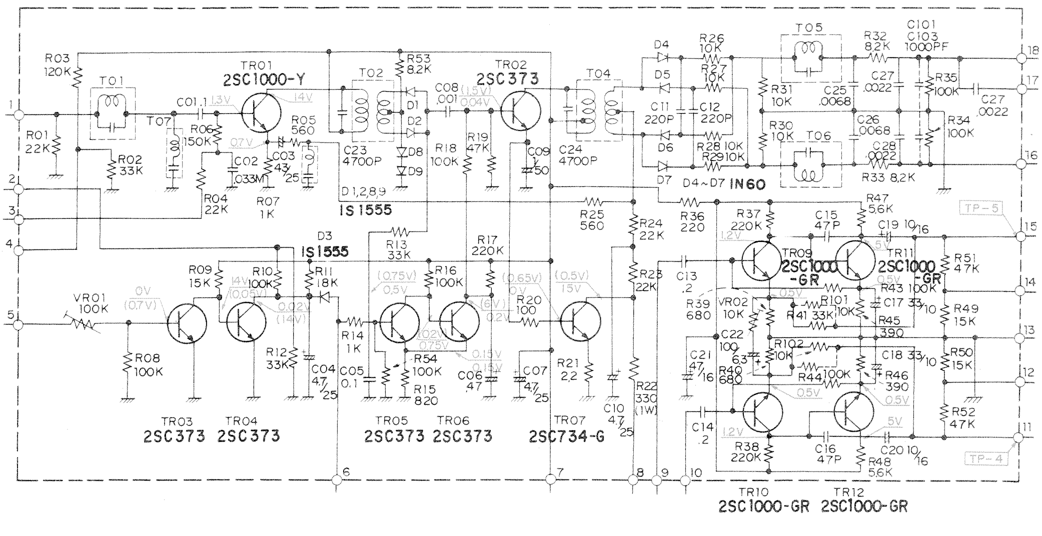

+B
IN FM
METER
AM IN
AM V.C
G
TR01 2SC380A-0
TR02 2SC380A-0
TR03 2SC380A-0
TR04 2SC380A-0
TR05 2SK19-GR
TR06 2SC941-0
TR07 2SC914-0
TR08 2SC371-0
TR09 2SC371-0
TR10 2SC372-0
TR11 2SC380A-0
IC01 TA7060
IC02 TA7060
D01 D02 IS1555
D03 D04 IS1555
D05 IN60
D06 IN60
D07 IN60
D09 IN60
D10 IN60
D11 IS1555
D12 IN60
D13 IN60
CF01
CF02
CF03
IT01
IT02
IT03
IT04
L01
L02
VR01 10K
TP-2
TP-3

FM MULTI CIRCUIT BOARD (CCT-MPX-C02)


FM IN
MUTING SW
GND
MUTING SIGNAL IN
TO FM MONO↔ST SW
FM OUT L-CH
FM OUT R-CH
TO FM ST INDICATOR LAMP
MPX-C02
22137301
VR01
VR02
1000P ※1
1000P ※1
14V 0.7V
14V
15V (0.3V)
14.5V
0.5V
1.2V
14V (0.05V)
0.02V (14V)
5V 0.5V
0.5V 5V
0.5V
1.2V
0.15V
0.2V (6V)
0.75V (0.2V)

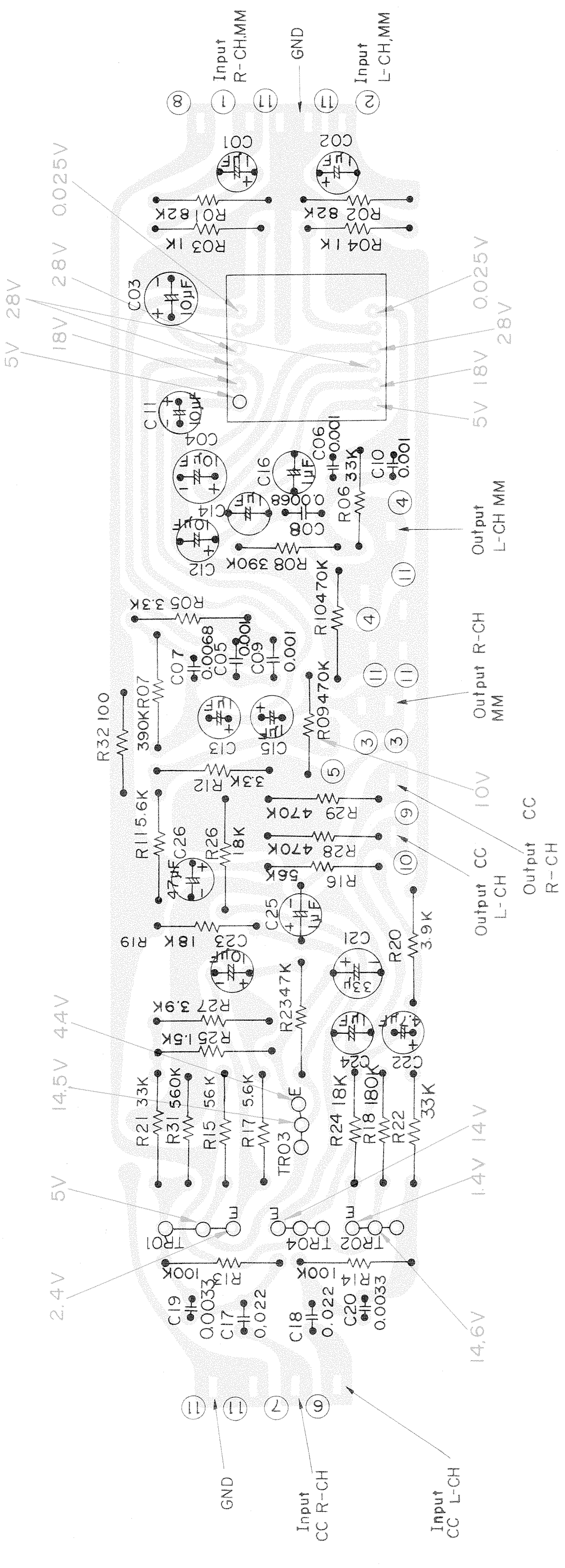
※1 Add 1,000p for 75µ sec de-emphasizing area.

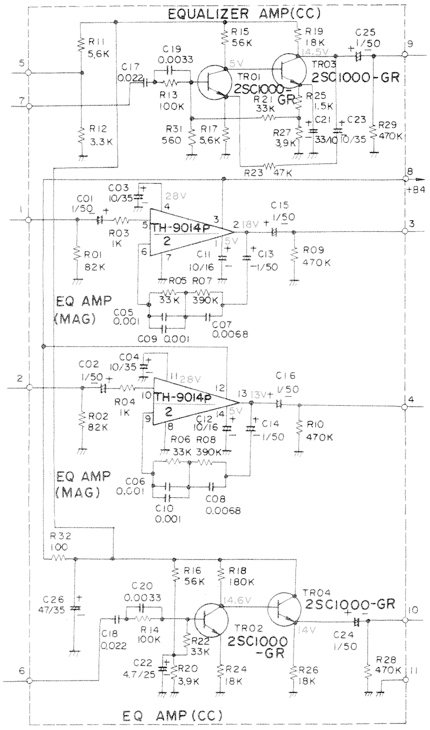
The voltage in bracket indicates the one measured with muting signal and stereo signal.


TR01 2SC1000-Y
TR02 2SC373
TR03 2SC373
TR04 2SC373
TR05 2SC373
TR06 2SC373
TR07 2SC734-G
TR09 2SC1000-GR
TR11 2SC1000-GR
TR10 2SC1000-GR
TR12 2SC1000-GR
D1,2,8,9 IS1555
D3 IS1555
D4~D7 IN60
C101 C103 1000PF
TP-5
TP-4

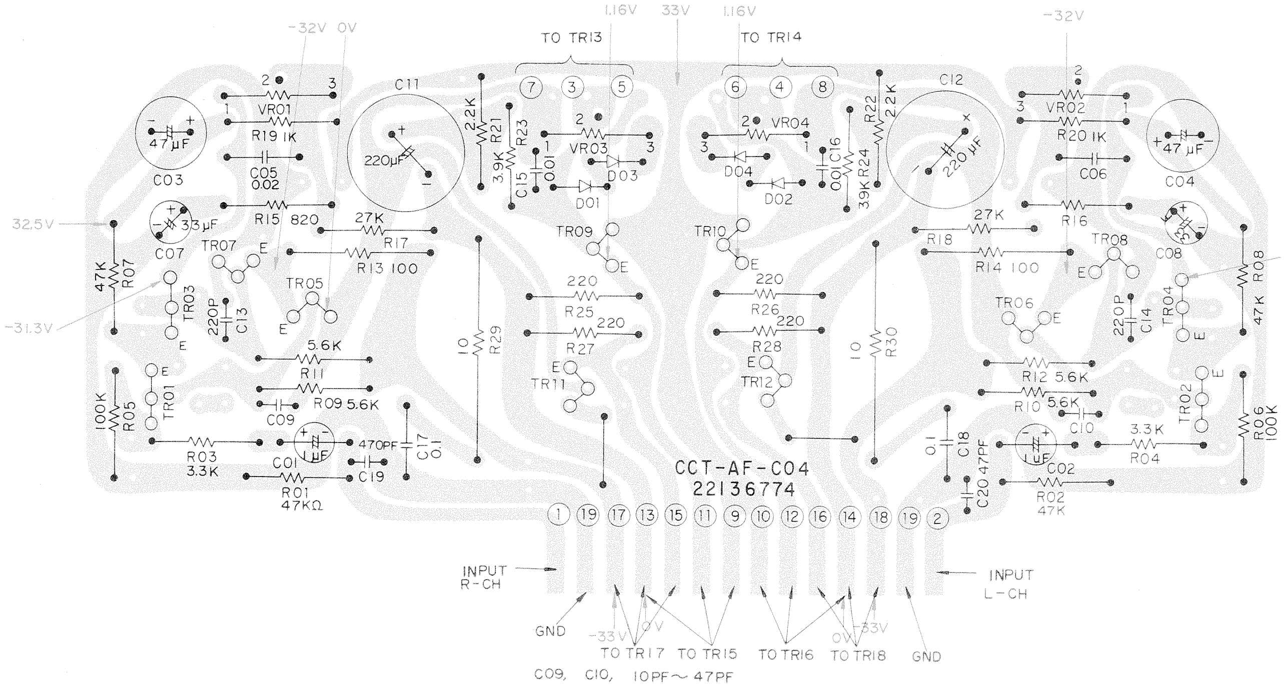
※1 1,000p (C101, C103) is available only for TA, TC and VL models.

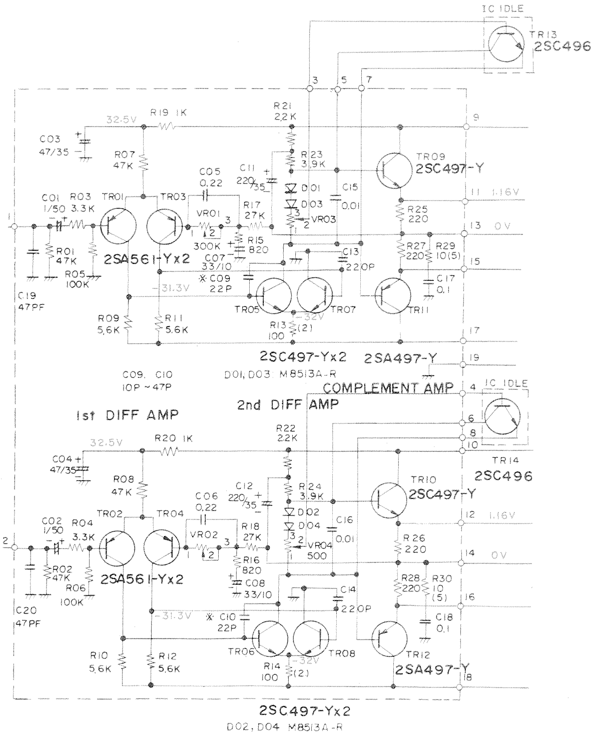
EQUALIZER CIRCUIT BOARD (CCT-AF-C09)


Input R-CH.MM
GND
Input L-CH.MM
C01
C02
R01 82K
R02 82K
R03 1K
R04 1K
C03 10μF
0.025V
28V
18V
5V
C11 10μF
C04
C16
C06 0.001
R06 33K
C10 0.001
C14
C08 0.0068
C12
R08 390K
Output L-CH MM
R05 3.3K
R10 470K
C07 0.0068
C05 0.001
C09 0.001
R32 100
R07 390K
C13
C15
R09 470K
Output R-CH MM
R12 3.3K
10V
R29 470K
R28 470K
R11 5.6K
C26 47μF
R26 18K
R16 56K
C25
Output CC L-CH
Output CC R-CH
R19 18K
C23
C21
R20 3.9K
R23 47K
R27 3.9K
R25 1.5K
C24
C22
4.4V
14.5V
R21 33K
R31 560K
R15 56K
R17 5.6K
TR03
R24 18K
R18 180K
R22 33K
14V
1.4V
5V
TR01
TR04
TR02
R13 100K
R14 100K
2.4V
14.6V
C19 0.0033
C17 0.022
C18 0.022
C20 0.0033
GND
Input CC R-CH
Input CC L-CH


EQUALIZER AMP(CC)
R11 5.6K
R12 3.3K
C17 0.022
C19 0.0033
R13 100K
R15 56K
R19 18K
TR01
TR03
2SC1000-GR
R21 33K
R25 1.5K
R31 560
R17 5.6K
R27 3.9K
C21 33/10
C23 10/35
C25 1/50
R29 470K
R23 47K
+B4
C01 1/50
C03 10/35
R03 1K
R01 82K
TH-9014P
C11 10/16
C13 1/50
C15 1/50
R09 470K
R05 33K
R07 390K
EQ AMP (MAG)
C05 0.001
C09 0.001
C07 0.0068
C02 1/50
C04 10/35
R04 1K
R02 82K
C12 10/16
C14 1/50
C16 1/50
R10 470K
R06 33K
R08 390K
C06 0.001
C10 0.001
C08 0.0068
R32 100
C26 47/35
C20 0.0033
C18 0.022
R14 100K
R16 56K
R18 180K
R22 33K
TR02
TR04
2SC1000-GR
C22 4.7/25
R20 3.9K
R24 18K
R26 18K
C24 1/50
R28 470K
EQ AMP (CC)

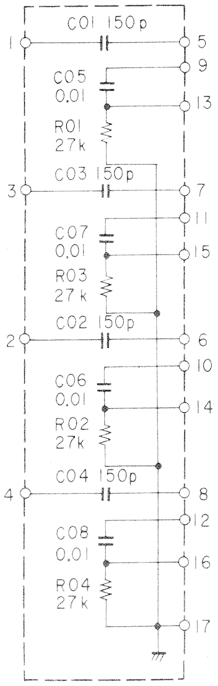
DRIVER CIRCUIT BOARD (CCT-AF-C04)


CCT-AF-C04
22136774
TO TR13
TO TR14
1.16V
33V
-32V
0V
32.5V
-31.3V
C11 220µF
C12 220µF
C03 47µF
C04 47µF
C07 3.3µF
C08 3.3µF
VR01
VR02
VR03
VR04
R19 1K
R20 1K
C05 0.02
C06
R15 820
R16
R17 27K
R18 27K
R13 100
R14 100
R21 2.2K
R22 2.2K
R23 3.9K
R24 3.9K
C15 0.01
C16 0.01
D01
D02
D03
D04
TR01
TR02
TR03
TR04
TR05
TR06
TR07
TR08
TR09
TR10
TR11
TR12
R25 220
R26 220
R27 220
R28 220
R29 10
R30 10
C13 220P
C14 220P
R07 47K
R08 47K
R11 5.6K
R12 5.6K
R09 5.6K
R10 5.6K
C09
C10
R05 100K
R06 100K
R03 3.3K
R04 3.3K
C01 1µF
C02 1µF
R01 47KΩ
R02 47K
C17 0.1
C18 0.1
C19 470PF
C20 47PF
INPUT R-CH
INPUT L-CH
GND
-33V
0V
TO TR17
TO TR15
TO TR16
TO TR18
C09, C10, 10PF～47PF


IC IDLE
TR13 2SC496
TR14 2SC496
1st DIFF AMP
2nd DIFF AMP
COMPLEMENT AMP
2SA561-Yx2
2SC497-Yx2
2SA497-Y
TR09 2SC497-Y
TR10 2SC497-Y
TR11
TR12 2SA497-Y
D01, D03 M8513A-R
D02, D04 M8513A-R
C09, C10 10P～47P
C03 47/35
C04 47/35
C01 1/50
C02 1/50
C05 0.22
C06 0.22
C07 33/10
C08 33/10
C11 220/35
C12 220/35
C19 47PF
C20 47PF
R19 1K
R20 1K
R21 2.2K
R22 2.2K
R23 3.9K
R24 3.9K
VR04 500
R15 820
R16 820
R13 100
R14 100
C09 22P
C10 22P
1.16V
0V
32.5V
-31.3V
-32V

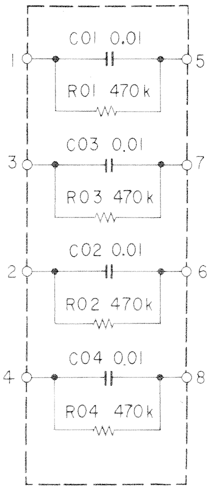
LOUDNESS CIRCUIT BOARD

(CCT-SWI-C01)

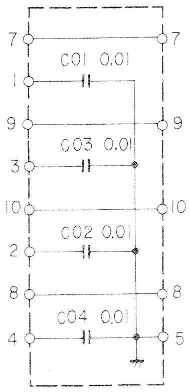

C01 150p
C05 0.01
R01 27k
C03 150p
C07 0.01
R03 27k
C02 150p
C06 0.01
R02 27k
C04 150p
C08 0.01
R04 27k
1
3
2
4
5
9
13
7
11
15
6
10
14
8
12
16
17

FILTER CIRCUIT BOARD

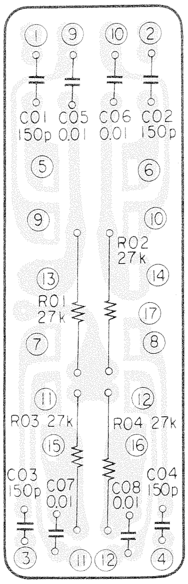
LOW (CCT-SWI-C03)

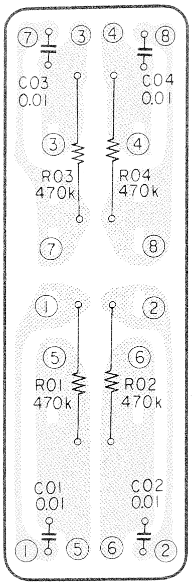

C01 0.01
R01 470k
C03 0.01
R03 470k
C02 0.01
R02 470k
C04 0.01
R04 470k
1
3
2
4
5
7
6
8

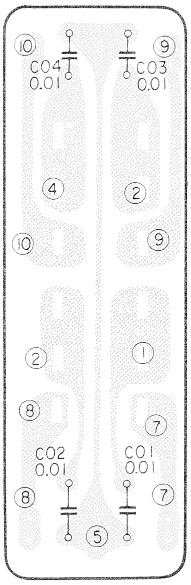
HIGH (CCT-SWI-C02)


C01 0.01
C03 0.01
C02 0.01
C04 0.01
7
1
9
3
10
2
8
4
5

BOTTOM VIEW

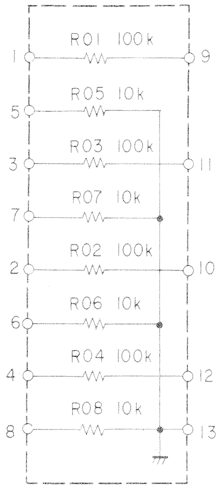

C01 150p
C05 0.01
C06 0.01
C02 150p
R02 27k
R01 27k
R03 27k
R04 27k
C03 150p
C07 0.01
C08 0.01
C04 150p


C03 0.01
C04 0.01
R03 470k
R04 470k
R01 470k
R02 470k
C01 0.01
C02 0.01


C04 0.01
C03 0.01
C02 0.01
C01 0.01

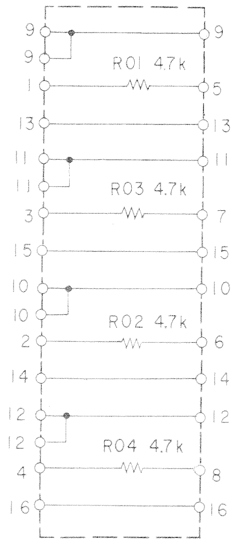
MUTING CIRCUIT BOARD

(CCT-SWI-C05)

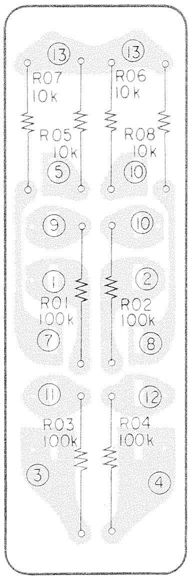

R01 100k
R05 10k
R03 100k
R07 10k
R02 100k
R06 10k
R04 100k
R08 10k
1
5
3
7
2
6
4
8
9
11
10
12
13

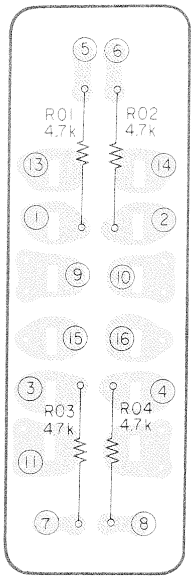
TAPE MONITOR CIRCUIT BOARD

(CCT-SWI-C06)


R01 4.7k
R03 4.7k
R02 4.7k
R04 4.7k
9
9
1
13
11
11
3
15
10
10
2
14
12
12
4
16
9
5
13
11
7
15
10
6
14
12
8
16

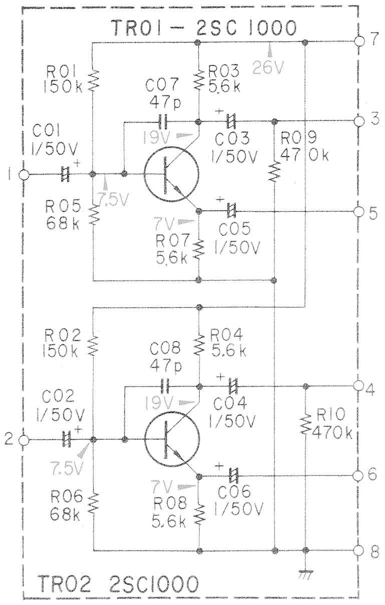
BOTTOM VIEW


13
13
R07 10k
R06 10k
R05 10k
R08 10k
5
10
9
10
1
2
R01 100k
R02 100k
7
8
11
12
R03 100k
R04 100k
3
4


5
6
R01 4.7k
R02 4.7k
13
14
1
2
9
10
15
16
3
4
R03 4.7k
R04 4.7k
11
7
8

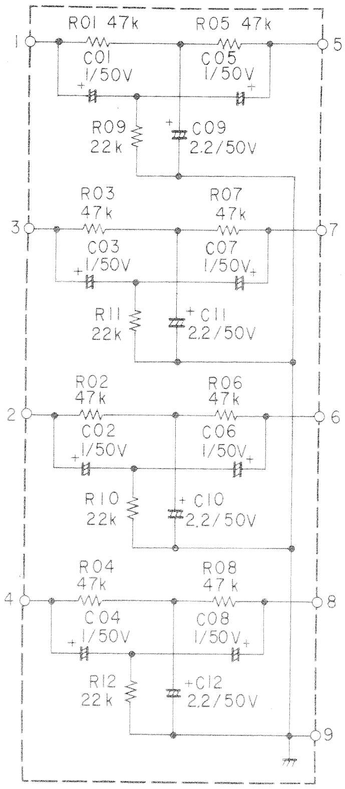
PHASE INVERT CIRCUIT BOARD

(CCT-AF-C13)

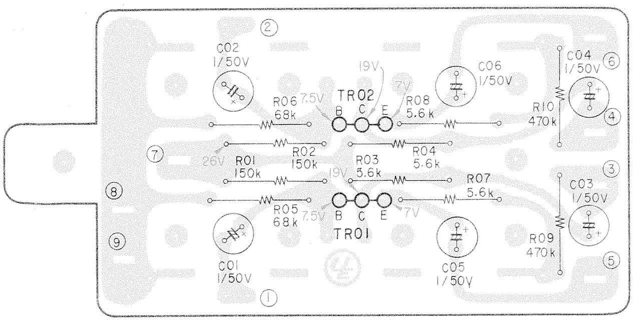

TR01 — 2SC 1000
R01 150k
C07 47p
R03 5.6k
26V
C01 1/50V
19V
C03 1/50V
R09 470k
7.5V
R05 68k
7V
R07 5.6k
C05 1/50V
R02 150k
C08 47p
R04 5.6k
C02 1/50V
C04 1/50V
R10 470k
R06 68k
R08 5.6k
C06 1/50V
TR02 2SC1000
1
2
3
4
5
6
7
8

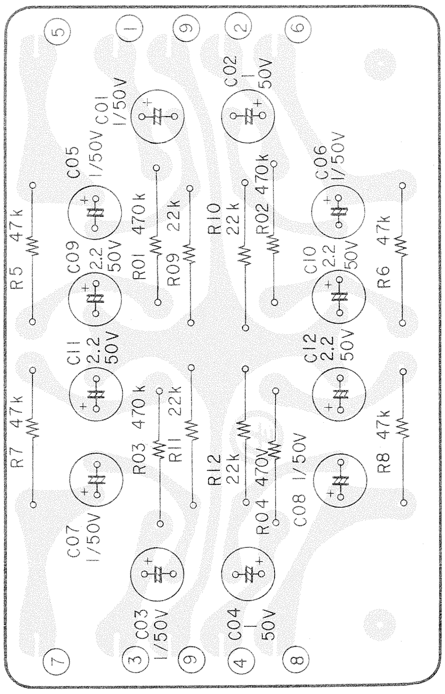
FILTER CIRCUIT BOARD

(CCT-FILT-C01)

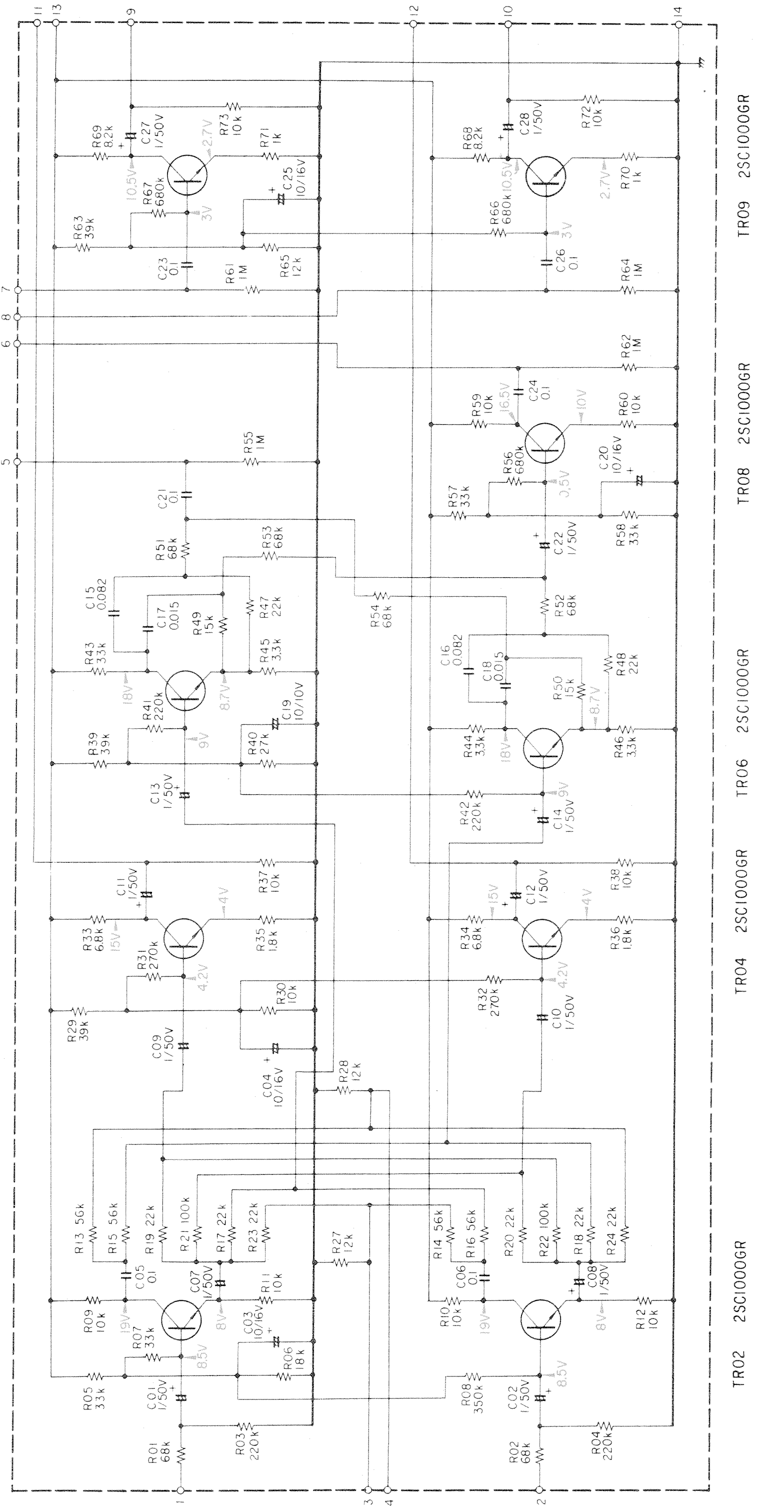

R01 47k
R05 47k
C01 1/50V
C05 1/50V
R09 22k
C09 2.2/50V
R03 47k
R07 47k
C03 1/50V
C07 1/50V
R11 22k
C11 2.2/50V
R02 47k
R06 47k
C02 1/50V
C06 1/50V
R10 22k
C10 2.2/50V
R04 47k
R08 47k
C04 1/50V
C08 1/50V
R12 22k
C12 2.2/50V
1
2
3
4
5
6
7
8
9

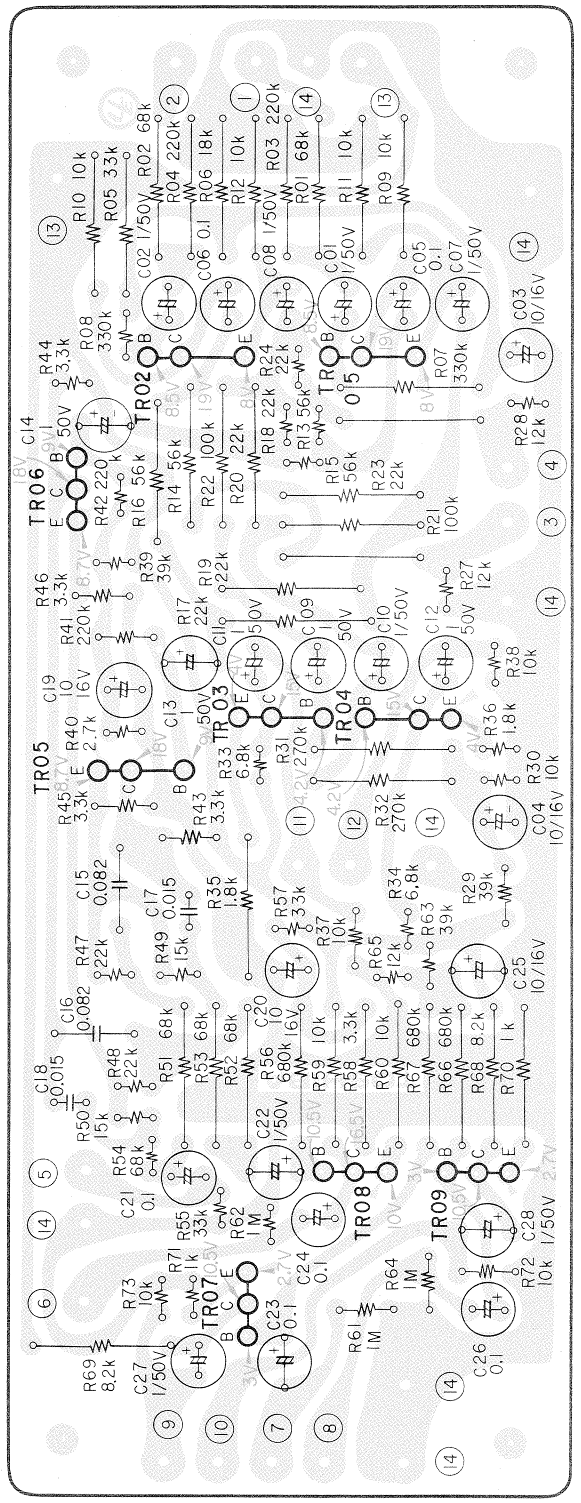
BOTTOM VIEW


C02 1/50V
R06 68k
TR02
B C E
R08 5.6k
C06 1/50V
C04 1/50V
R10 470k
R02 150k
R01 150k
R03 5.6k
R04 5.6k
R07 5.6k
C03 1/50V
R05 68k
TR01
R09 470k
C01 1/50V
C05 1/50V
26V
19V
7.5V
7V
①
②
③
④
⑤
⑥
⑦
⑧
⑨

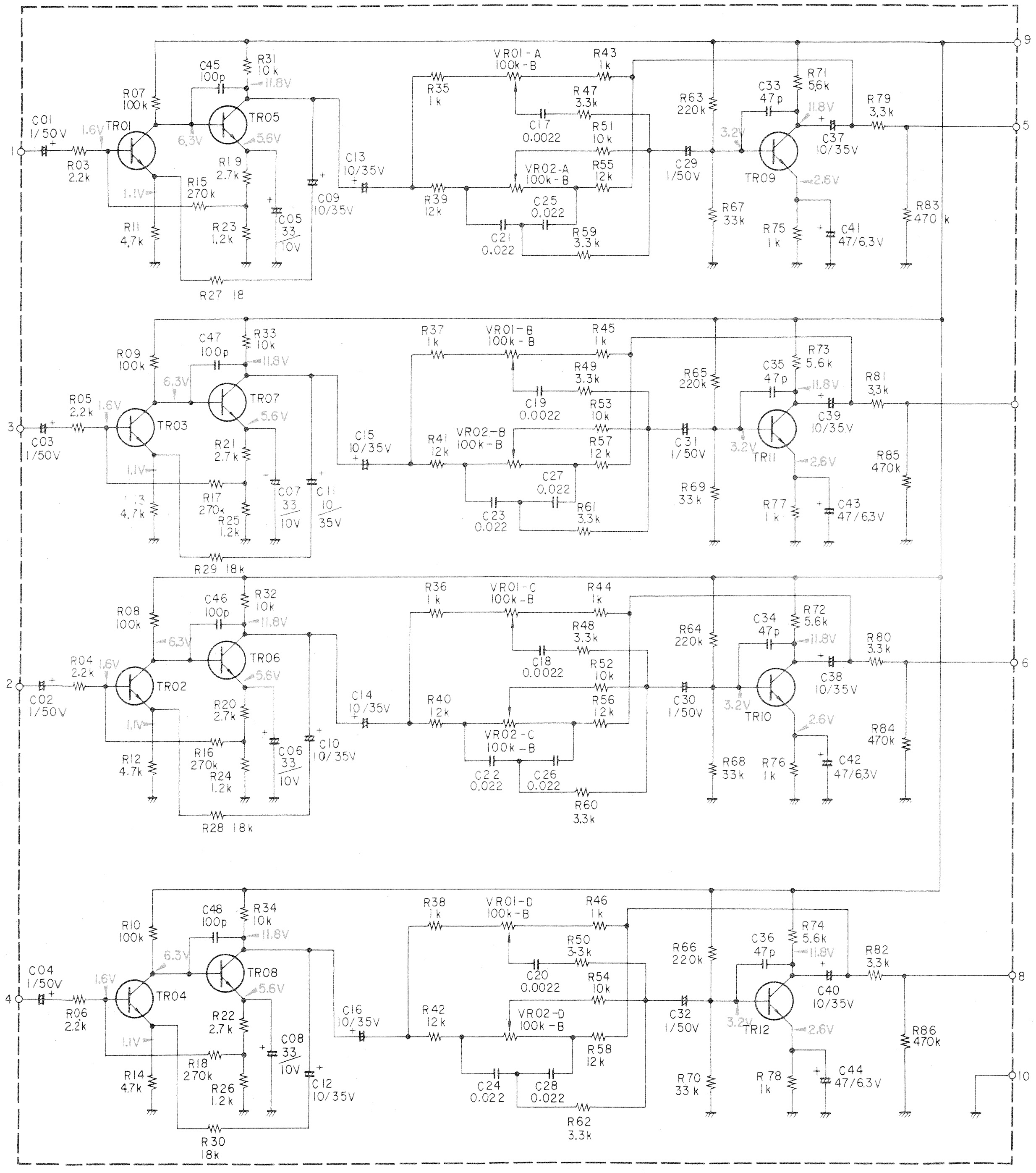

⑤ ① ⑨ ② ⑥
C01 1/50V
C02 1/50V
C05 1/50V
C06 1/50V
R5 47k
C09 2.2 50V
R01 470k
R09 22k
R10 22k
R02 470k
C10 2.2 50V
R6 47k
C11 2.2 50V
C12 2.2 50V
R7 47k
R03 470k
R11 22k
R12 22k
R04 470k
C08 1/50V
R8 47k
C07 1/50V
C03 1/50V
C04 1/50V
⑦ ③ ⑨ ④ ⑧

MATRIX CIRCUIT BOARD (CCT-AF-C10)


TR07 2SC1000GR
TR05 2SC1000GR
TR03 2SC1000GR
TR01 2SC1000GR
TR09 2SC1000GR
TR08 2SC1000GR
TR06 2SC1000GR
TR04 2SC1000GR
TR02 2SC1000GR

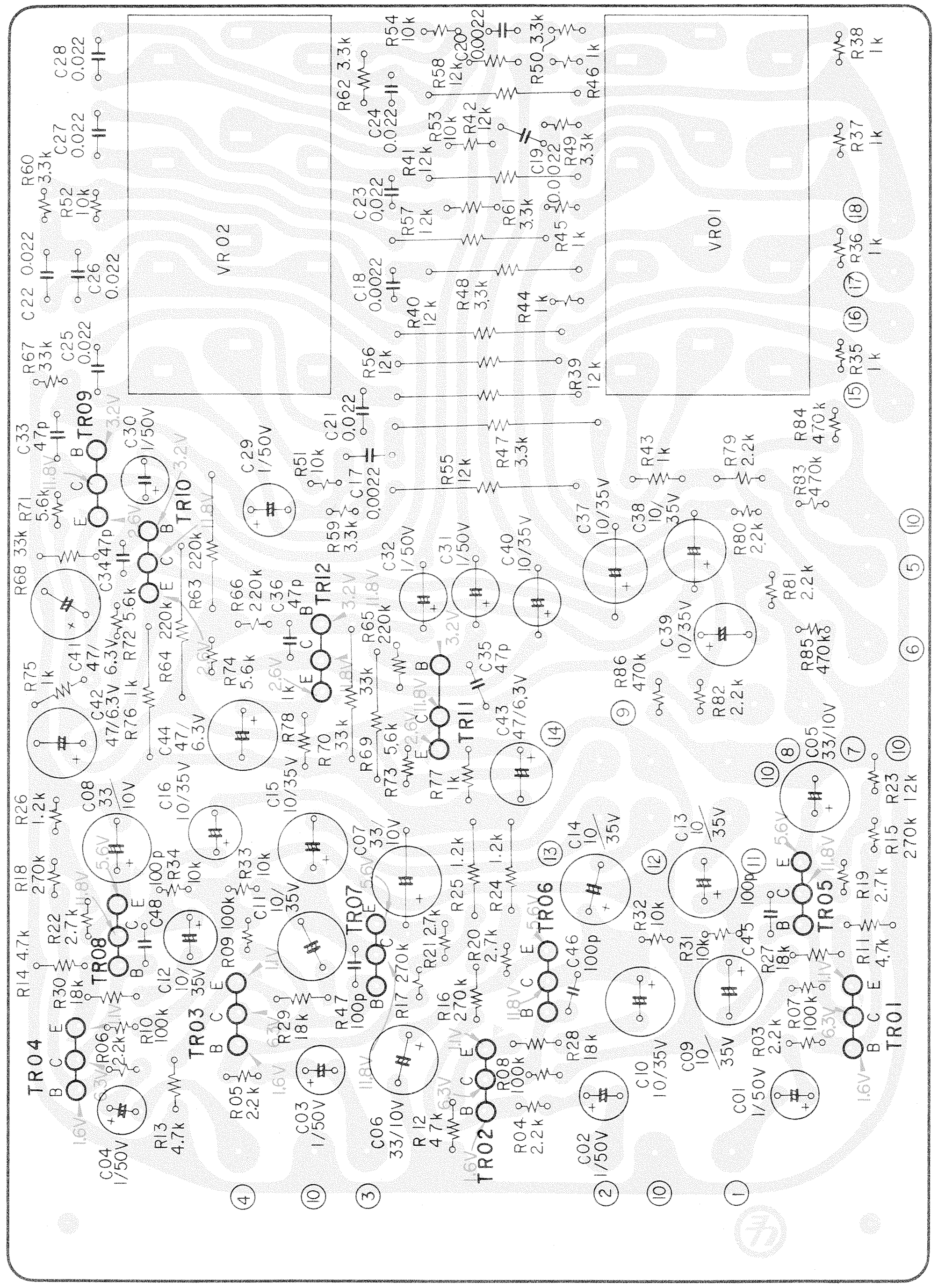

TR01
TR02
TR03
TR04
TR05
TR06
TR07
TR08
TR09

TONE CIRCUIT BOARD (CCT-AF-C14)

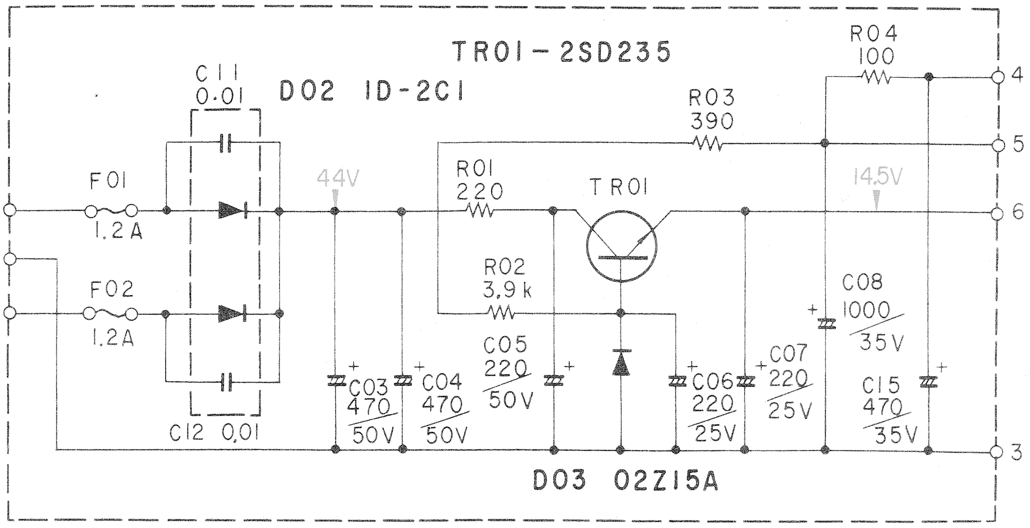

C01 1/50V
R03 2.2k
TR01
R07 100k
C45 100p
R31 10k
TR05
R19 2.7k
R15 270k
R11 4.7k
R23 1.2k
C05 33/10V
C09 10/35V
C13 10/35V
R27 18
R35 1k
VR01-A 100k-B
R43 1k
R47 3.3k
C17 0.0022
R51 10k
VR02-A 100k-B
R55 12k
R39 12k
C25 0.022
C21 0.022
R59 3.3k
R63 220k
C29 1/50V
C33 47p
R71 5.6k
TR09
C37 10/35V
R79 3.3k
R67 33k
R75 1k
C41 47/6.3V
R83 470k
C03 1/50V
R05 2.2k
TR03
R09 100k
C47 100p
R33 10k
TR07
R21 2.7k
R17 270k
R13 4.7k
R25 1.2k
C07 33/10V
C11 10/35V
R29 18k
C15 10/35V
R37 1k
VR01-B 100k-B
R45 1k
R49 3.3k
C19 0.0022
R53 10k
R41 12k
VR02-B 100k-B
R57 12k
C27 0.022
C23 0.022
R61 3.3k
R65 220k
C31 1/50V
C35 47p
R73 5.6k
TR11
C39 10/35V
R81 3.3k
R69 33k
R77 1k
C43 47/63V
R85 470k
C02 1/50V
R04 2.2k
TR02
R08 100k
C46 100p
R32 10k
TR06
R20 2.7k
R16 270k
R12 4.7k
R24 1.2k
C06 33/10V
C10 10/35V
R28 18k
C14 10/35V
R36 1k
VR01-C 100k-B
R44 1k
R48 3.3k
C18 0.0022
R52 10k
R40 12k
R56 12k
VR02-C 100k-B
C22 0.022
C26 0.022
R60 3.3k
R64 220k
C30 1/50V
C34 47p
R72 5.6k
TR10
C38 10/35V
R80 3.3k
R68 33k
R76 1k
C42 47/63V
R84 470k
C04 1/50V
R06 2.2k
TR04
R10 100k
C48 100p
R34 10k
TR08
R22 2.7k
R18 270k
R14 4.7k
R26 1.2k
C08 33/10V
C12 10/35V
R30 18k
C16 10/35V
R38 1k
VR01-D 100k-B
R46 1k
R50 3.3k
C20 0.0022
R54 10k
R42 12k
VR02-D 100k-B
R58 12k
C24 0.022
C28 0.022
R62 3.3k
R66 220k
C32 1/50V
C36 47p
R74 5.6k
TR12
C40 10/35V
R82 3.3k
R70 33k
R78 1k
C44 47/63V
R86 470k
1.6V
6.3V
1.1V
11.8V
5.6V
3.2V
2.6V
1
2
3
4
5
6
8
9
10

TR01~TR08 2SC1000GR TR09~TR12 2SC1000GR

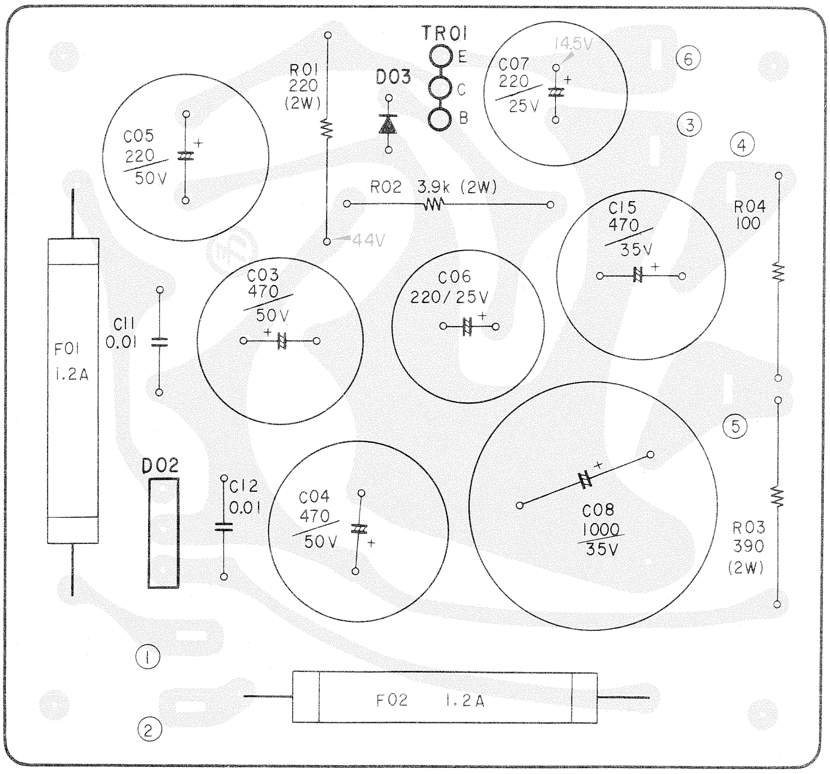
BOTTOM VIEW


VR02
VR01
TR01
TR02
TR03
TR04
TR05
TR06
TR07
TR08
TR09
TR10
TR11
TR12
B C E
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

POWER SUPPLY CIRCUIT BOARD (CCT-SPLY-C06)


TR01 - 2SD235
D02 1D-2C1
D03 02Z15A
C11 0.01
C12 0.01
F01 1.2A
F02 1.2A
44V
14.5V
R01 220
R02 3.9k
R03 390
R04 100
TR01
C03 470 50V
C04 470 50V
C05 220 50V
C06 220 25V
C07 220 25V
C08 1000 35V
C15 470 35V
1
2
3
4
5
6

BOTTOM VIEW


TR01
E
C
B
D03
R01 220 (2W)
C05 220 50V
C07 220 25V
14.5V
R02 3.9k (2W)
44V
C03 470 50V
C06 220/25V
C15 470 35V
R04 100
C11 0.01
F01 1.2A
D02
C12 0.01
C04 470 50V
C08 1000 35V
R03 390 (2W)
F02 1.2A
①
②
③
④
⑤
⑥

14. PACKING

TE Model

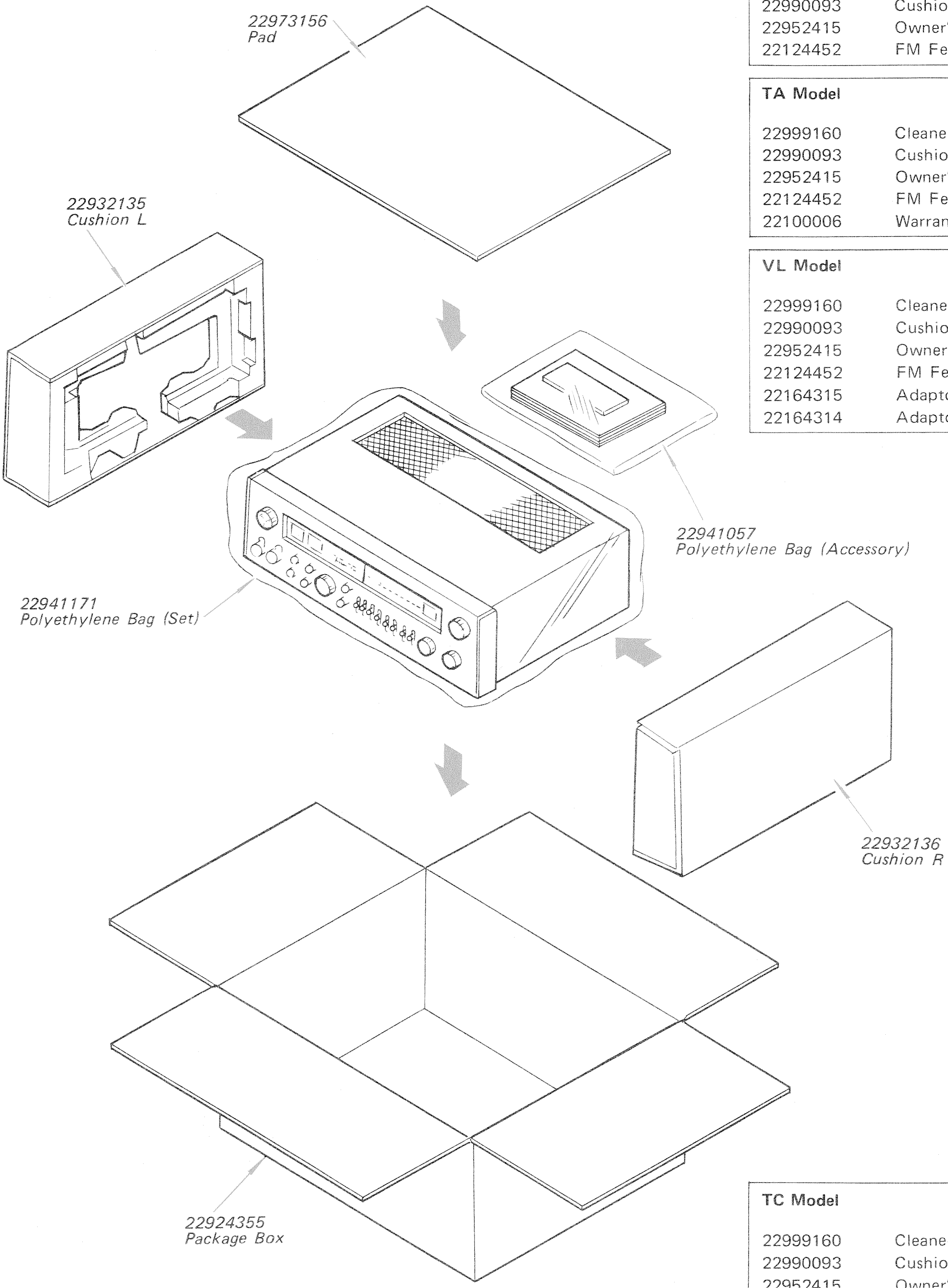
22999160	Cleaner Cloth
22990093	Cushion Assembly
22952415	Owner's Manual (Set)
22124452	FM Feeder Antenna

TA Model

22999160	Cleaner Cloth
22990093	Cushion Ass'y
22952415	Owner's Manual (Set)
22124452	FM Feeder Antenna
22100006	Warranty Card

VL Model

22999160	Cleaner Cloth
22990093	Cushion Ass'y
22952415	Owner's Manual (Set)
22124452	FM Feeder Antenna
22164315	Adaptor AC Plug
22164314	Adaptor AC Plug


22973156
Pad
22932135
Cushion L
22941057
Polyethylene Bag (Accessory)
22941171
Polyethylene Bag (Set)
22932136
Cushion R
22924355
Package Box

TC Model

22999160	Cleaner Cloth
22990093	Cushion Ass'y
22952415	Owner's Manual (Set)
22124452	FM Feeder Antenna
2210005	Warranty Card

15. PARTS LISTS

SYMBOL No.	PART No.	DESCRIPTION
ELECTRICAL PARTS		
F001	22144235	FUSE 3.0A UL
S001	22146578	Rotary-Switch (Select)
S002	22146537	Rotary-Switch (Mode)
S003,013,014 S015,016,017	22146502	Lever-Switch
S004,005	22145995	Lever-Switch
S006	22146505	Slide-Switch
S007	22146563	Rotary-Switch
S008,009 S010,011	22148605	Circuit Breaker 3.15A Speaker Protector
S012	22148602	Circuit Breaker 2.5A Speaker Protector
J001,002	22167138	AC Concent
J003,004 J005,006	22162260	TERMINAL-P4P (SPEAKER)
J007,015	22163175	JACK (Head Phone)
J008	22167145	Voltage Selector
J009	22163361	Jack-US1P (MPX OUT)
J010,012	22163290	Jack-US10P (PHONO-AUX PREOUT-MAIN IN)
J011	22167138	DIN Socket (REC/PB)
J013	22163213	Jack-US8P
J014	22162259	TERMINAL-S4P (ANTENNA)
PT-001	22213850	TRANS-PT8015 (Power TRANS)
VR001	22650417	250 kohm B MAIN Volume
VR002,003 VR004,005	22638400	250 kohm B Level Volume
PL001,002, PL003,004 PL005,007	22113211	PL-8.0CLR 300HA
PL006,008 PL009,110 PL011,012 PL013,014 PL015,016	22113239	PL-8.0 CLR 50LT5
(PL008,009 PL014,015 PL016)	22830027	4 CH Indicator
PL017	22113238	PL-6.0 CLR 30LT5
M001	22104077	METER-TUN
M002	22104079	METER-SIG
D001	22115140	D-5B-2 diode
	To 22115146 (Modification)	Diode, 5B2
TR005,006 TR009,010	31210663	TR-2SA663-BL Transistor
TR007,008 TR011,012	31230793	TR-2SC793-BL Transistor
C001,002	22321201	0.022μF ±20% 2500F/m Capacitor UL
C003,004	22430029	3300μF 50WV Electric Capacitor
C005	22445470	47μF 10WV Electric Capacitor
C006	22382222	2200pF 50V ±10% PS (Capacitor)
C007,008 C009,010	22362101	100pF 50V ±10% CC (SC) (Capacitor)
C011,012 C013,014	22340030	0.01μF 500V $\pm^{100}_{0}$% CK (Capacitor)
R001,002	22563105	1 Mohm 1/2W ±10% Solid Resistor
R007,008 R009,010	22570022	220 ohm 2W ±10% Metalized film Resistor
R011,012 R013,014 (R015,016 R017,018	22500048	0.5 ohm 3W ±10% Cement type Resistor
R019,020	22544224	220 kohm 1/8W ±10% Carbon Resistor
R021,022	22544823	82 kohm 1/8W ±10% Carbon Resistor
R023,024	22544332	3.3 kohm 1/8W ±10% Carbon Resistor
R025,026 R027	22544103	10 kohm 1/8W ±10% Carbon Resistor
L001	22290002	Coil-LH9050 (Balumn, trans)
L002,003	22211144	Coil-LH10S 1μH
	22242453	Coil-FA1618 Ferrite Antenna
	22160016	PC CONNECTOR-1
	22167243	Socket (Fuse type)
	22162258	TERMINAL-S1P (Ground)
	22164311	PLUG US1P
	22164325	PLUG-2P
	25845120	NY. BUSH-SR3P4 (for TA, TC, VL)
	22751075	BUSH (for TE)
	22757025	ANTENNA Holder
	22862201	MARK-UL-R (for TA)
	22863727	NAME-PLATE (for TE, VL)
	22702113	HEXAGON CAP-NUT (for TA, TC)
	22703123	W4 2SS1.2 (for TA, TC)
	22382102	0.001μF 50V ±10% (PS)(for TA,TC, VL)
	22176286	STECKER-PLG (for TE)
	22176221	VL-PLG-CORD (for TA, TC, VL)
	22165048	Holder Fuse
	22116086	Socket (Transistor)
	22751081	LAMP Holder
	22163106 (Addition)	Jack, DIN
MECHANISM & CABINET PARTS		
	22845193	KNOB
	20794038	SCREW
	22711240	JACK PLATE
	22742071	16 OL DRUM
	22749108	Tuning Shaft Assembly B
	22749110	POINTER ASSY
	22754155	CLAMP
	22828031	Leg
	22836275	DIAL PLATE
	22842123	BOTTOM COVER
	22863698	CAUTION PLATE
	22950273	LABEL (3.15A Breaker)
	22950297	CAUTION LABEL (2A Fuse)
	22950298	CAUTION LABEL (1.2A Fuse)
	22950316	CAUTION LABEL (2.5A Breaker)
	22826090	KNOB (SELECTOR, MODE)
	22956328	MASK SPACER
	22819105	CABINET
	22824149	KNOB (TUNING)
	22826087	KNOB (Power Volume)
	22826088	KNOB (TONE)
	22826089	KNOB (TONE)
	22826091	KNOB (Level)
	22837188	DIAL COVER
	22838069	DECORATION FRAME
	22843421	PANEL ASSY
	22843428	SIDE-PANEL
RF UNIT ASSEMBLY (CCT-RF-C03)		
TR01,02		Transistor 3SK35-GR
TR03		Transistor 2SC785-0
D01		Diode 1S2236

SYMBOL No.	PART No.	DESCRIPTION
L01	22292019	FMRF Coil RT-8054
L02	22292020	FMRF Coil RT-8053
L03	22294217	FMRF Coil RT-8055
L04	22295016	FMRF Coil RT-8057
L05	22241009	Choke Coil LH-9046
IT01	22265655	IF Transformer IT-6478
VC01	22307352	
VC02	22309108	Semifixed Capacitor
	CAPACITORS	
C1,02	22361509	Ceramic 50WV 5pFD
C04,05,06	22341472	Ceramic 50WV 0.0047μF
C07,13	22341203	Ceramic 50WV 0.02μF
C08,14,20	22341103	Ceramic 50WV 0.01μF
C09	22360140	Ceramic 50WV 18PFJ
C10,11,19	22341102	Ceramic 50WV 0.001μF
C12	22360242	Ceramic 50WV 180PFK
C15	22360137	Ceramic 50WV 39PFJ
C16,18	22360131	Ceramic 50WV 10PFJ
C17	22360138	Ceramic 50WV 10PFJ
C21	22360132	Ceramic 50WV 15PFJ
	RESISTORS	
R01,08	22554104	Film, 1/8SZ 100 kohm
R02	22544334	Film, 1/8PK 330 kohm
R03	22544124	FIlm, 1/8PK 120 kohm
R04	22544101	Film, 1/8PK 100 ohm
R05	22544221	Film, 1/8PK 220 ohm
R07	22544331	Film, 1/8PK 330 ohm
R09	22554102	Film, 1/8SZ 1 kohm
R10	22554152	Film, 1/8SZ 1.5 kohm
R11	22554103	Film, 1/8SZ 10 kohm
R12	22554472	Film, 1/8SZ 4.7 kohm
R13	22544223	Film, 1/8PK 22 kohm
R14	22554105	Film, 1/8SZ 1 Mohm
R15	22544104	Film, 1/8PK 100 kohm
R16	22554153	Film, 1/8PK 15 kohm
R17	22544563	Film, 1/8PK 56 kohm
	IF UNIT ASSEMBLY (CCT-IF-C02)	
TR01~04 TR11	2SC380AO	Transistor 2SC380A-0
TR05	2SK19GR	Transistor 2SK19-GR
TR06,07	2SC9410	Transistor 2SC941-0
TR08,09	2SC3710	Transistor 2SC371-0
TR10	2SC3720	Transistor 2SC372-0
D01~04 D11	IS1555	Diode IS1555
D05,06,09	IN60	Diode IN60
D07,08,09 D12,13	IN60PR	Diode IN60 PAIR
IC01,02	TA7060P	IC, TA7060P
L01	22244046	AMRF Coil RT-6064
L02	22245232	AM Generator Coil, RT-7288
L03~06	22241009	Choke Coil, LH-9046
IT01	22267306	FMIF Transformer IT-8475
IT02	22264626	AMIF Transformer IT-5477
IT03	22266308	AMIF Transformer IT-5476
IT04	22265654	FMIF Transformer IT-6479

SYMBOL No.	PART No.	DESCRIPTION
CF01,02	22153017	FM Ceramic Filter SFG-10.7MA
CF03	22153009	AM Ceramic Filter SF-455D
VR01	22658177	Semifixed Resistor VR103 10 kohm
	CAPACITORS	
C01~04 C08,09,12	22341103	Ceramic 50WV 0.01μF
C05,13	22445470	Electrolytic 16WV 47μF
C06,11 C14,15	22341203	Ceramic 50WV 0.02μF
C10,19	22341102	Ceramic 50WV 0.001μF
C16,25	22362270	Ceramic 50WV 27pF
C17,18,20	22341203	Ceramic 50WV 0.02μF
C21,22,24	22381471	Polystyrene 50WV 470pF
C23	22445470	Electrolytic 16WV 47μF
C38,52 C26,27	22341203	Ceramic 50WV 0.02μF
C54 C28~30	22362221	Ceramic 50WV 220pF
C31,32,61	22445100	Electrolytic 16WV 10μF
C33,35,37 C40,43	22381471	Polystyrene 50WV 470pF
C34	22373104	Mylar 50WV 0.1μF
C36,42,54	22446479	Electrolytic 25WV 4.7μF
C39	22361609	Ceramic 50WV 0.6pF
C41	22360007	50WV 1.5pF
C44,45 C58,59	22373103	Mylar 50WV 0.01μF
C46,48,50 C51,55,56	22381471	Polystyrene 50WV 470pF
C47	22362220	Ceramic 50W 22pF
C53,60	22445470	Electrolytic 16WV 47μF
C57	22341472	Ceramic 50WV 0.0047μF
C62~64	22381471	Polystyrene 50WV 470pF
C65	22341103	Ceramic 50WV 0.01μF
C67	22362100	Ceramic 50WV 10pF
	RESISTORS	
R01,12	22544561	Film, 1/8PK 560 ohm
R02,54	22544471	Film, 1/8PK 470 ohm
R03,15	22544391	Film, 1/8PK 390 ohm
R04,14	22544563	Film, 1/8PK 56 kohm
C05,16,52	22544562	Film, 1/8PK 5.6 kohm
C06,07 C17,18	22544102	Film, 1/8PK 1 kohm
C08,19,24 C31,43	22544101	Film, 1/8PK 100 ohm
C09,13 C20,28	22544221	Film, 1/8PK 220 ohm
C10,21,33	22544104	Film, 1/8PK 100 kohm
C11,22 C23,27	22544331	Film, 1/8PK 330 ohm
C25	22554681	Film, 1/8SZ 680 ohm
C26	22544122	Film, 1/8PK 1.2 kohm
C29,30,32 C36,41,47	22544102	Film, 1/8PK 1kohm
C34	22544823	Film, 1/8PK 82 kohm
C35,45	22544103	Film, 1/8PK 10 kohm
C37	22544473	Film, 1/8PK 47 kohm
C38,53	22544123	Film, 1/8PK 12 kohm

SYMBOL No.	PART No.	DESCRIPTION
C39,60,71	22544223	Film, 1/8PK 22 kohm
C40	22544154	Film, 1/8PK 150 kohm
C42	22544224	Film, 1/8PK 220 kohm
C44,49,63	22544221	Film, 1/8PK 220 ohm
C46	22544683	Film, 1/8PK 68 kohm
C48	22544332	Film, 1/8PK 3.3 kohm
C50	22544472	Film, 1/8PK 4.7 kohm
C51,55,57, C69	22544103	Film, 1/8PK 10 kohm
C56,68,70	22544102	Film, 1/8PK 1 kohm
C58,64,67	22544822	Film, 1/8PK 8.2 kohm
C61	22544333	Film, 1/8PK 33 kohm
C62	22544222	Film, 1/8PK 2.2 kohm
C65	22554562	Film, 1/8SZ 5.6 k ohm
C66	22544393	Film, 1/8PK 39 kohm
FM MPX UNIT ASSEMBLY (CCT-MPX-C02)		
TR01	2SC1000Y	Transistor 2SC1000-Y
TR02~06	2SC373	Transistor 2SC373
TR7	2SC734GR	Transistor 2SC734-GR
TR09~12	2SC1000G	Transistor 2SC1000-GR
D01~03	IS1555	Diode 1S1555
D04~07	IN60PR	Diode 1N60 PAIR
T01	22212026	Stereo Coil 67 kHz ST-3204
T02	22212029	Stereo Coil ST-1111 19 kHz
T03	22212028	Stereo Coil ST-1112 19 kHz
T04	22212030	Stereo Coil ST-2306 38 kHz
T05,06	22212027	Stereo Coil ST-2307 38 kHz
T07	22212035	Stereo Coil ST-135 72 kHz
VR01	22658178	Semifixed Resistor R104 100 kohm
	CAPACITORS	
C01	22373104	Mylar 50WV 0.1μF
C02	22373333	Mylar 50WV 0.033μF
C03,04,10	22446479	Electrolytic 25WV 4.7μF
C05,06	22373103	Mylar 50WV 0.01μF
C07,21	22445470	Electrolytic 16WV 47μF
C08	22373102	Mylar 50WV 1,000pF
C09	22448109	Electrolytic 50WV 1μF
C11,12	22362221	Ceramic 50WV 220pF
C13,14	22340001	Ceramic 0.2μFZ
C15,16	22362470	50WV 47pF
C17,18	22443330	Electrolytic 10WV 33μμF
C19,20	22445100	Electrolytic 16WV 10μF
C22	22442101	Electrolytic 6WV 100μF
C23,24	22382472	Polystyrene 50WV 0.0047μF
C25,26	22371682	Mylar 50WV 0.0068μF
C27,28	22371222	Mylar 50WV 0.0022μF
C29	22373222	Mylar 50WV 0.0022μFM
	RESISTORS	
R01,04 R23,24	22544223	Film, 1/8PK 22 kohm
R02,41 R12,13	22544333	Film, 1/8PK 33 kohm
R03	22544124	Film 1/8PK 120 kohm
R05	22554561	Film, 1/8SZ 560 ohm
R06	22544154	Film, 1/8PK 150 kohm

SYMBOL No.	PART No.	DESCRIPTION
EQ UNIT ASSEMBLY (CCT-AF-C09)		
R01,02	22544823	82 kohm ±10% 1/8W RD
R03,04	22544102	1 kohm ±10% 1/8W RD
R05,06	22544333	33 kohm ±10% 1/8W RD
R07,08	22544394	390 kohm ±10% 1/8W RD
R09,10	22544474	470 kohm ±10% 1/8W RD
R11	22544562	5.6 kohm ±10% 1/8W RD
R12	22544332	3.3 kohm ±10% 1/8W RD
R13,14	22544104	100 kohm ±10% 1/8W RD
R15	22544563	56 kohm ±10% 1/8W RD
R16	22544563	56 kohm ±10% 1/8W RD
R17	22544562	5.6 kohm ±10% 1/8W RD
R18	22544184	180 kohm ±10% 1/8W RD
R19	22544183	18 kohm ±10% 1/8W RD
R20	22544392	3.9 kohm ±10% 1/8W RD
R21	22544333	33 kohm ±10% 1/8W RD
R22	22544333	33 kohm ±10% 1/8W RD
R23	22544473	47 kohm ±10% 1/8W RD
R24	22544183	18 kohm ±10% 1/8W RD
R25	22544152	1.5 kohm ±10% 1/8W RD
R26	22544183	18 kohm ±10% 1/8W RD
R27	22544392	3.9 kohm ±10% 1/8W RD
R28	22544474	470 kohm ±10% 1/8W RD
R29	22544474	470 kohm ±10% 1/8W RD
R30		—
R31	22544564	560 kohm ±10% 1/8W RD
R32	22544101	100 ohm ±10% 1/8W RD
C01,02	22448109	1μF 50WV CE
C03,04	22447100	10μF 35WV CE
C05,06	22373102	0.001μF 50V ±20% MY
C07,08	22373682	0.0068μ 50V ±20% MY
C09,10	22373102	0.001μF 50V ±20% MY
C11,12	22445100	10μF 16WV CE
C13,14	22448109	1μF 50WV CE
C15,16	22448109	1μF 50WV CE
C17,18	22373223	0.022μF 50V ±20% MY
C19,20	22373332	0.0033μF 50V ±20% MY
C21	22443330	33μF 10WV CE
C22	22446479	4.7μF 25WV CE
C23	22447100	10μF 35WV CE
C24	22448109	1μF 50WV CE
C25	22448109	1μF 50WV CE
C26	22447470	47μF 35WV CE
IC01		TH9014P
TR01,02		2SC1000-GR
TR03,04		2SC1000-GR
TONE UNIT ASSEMBLY (CCT-AF-C14)		
TR01,02,03 TR04,05,06 TR07,08,09 TR10,11,12	31231000	TR-2SC1000-GR Transistor
	CAPACITORS	
C01,02,03,04 C29,30,31,32	22448109	1μF 50WV Electric Capacitor
C05,06,07,08	22443330	33μF 10WV Electric Capacitor

SYMBOL No.	PART No.	DESCRIPTION
C09,10,11,12 C13,14,15,16 C37,38,39,40	22447100	10μF 35WV Electric Capacitor
C17,18,19,20	22373222	0.0022μF 50V ±20% MY
C21,22,23,24 C25,26,27,28	22373223	0.022μF 50V ±20% MY
C33,34,35,36	22362470	47pF 50V ±10% CC (SL)
C41,42,43,44	22442470	47μF 6.3WV Electric Capacitor
C45,46,47,48	22362101	100pF 50V ±10% CC (SL)
	CARBON RESISTORS	
R03,04,05,06	22554222	2.2 kohm 1/8W ±10% Single ended
R07,08,09,10	22554104	100 kohm 1/8W ±10% Single ended
R11,12,13,14	22554472	4.7 kohm 1/8W ±10% Single ended
R15,16,17,18	22554274	270 kohm 1/8W ±10% Single ended
R19,20,21,22	22554272	2.7 kohm 1/8W ±10% Single ended
R23,24,25,26	22554122	1.2 kohm 1/8W ±10% Single ended
R27,28,29,30	22554183	18 kohm 1/8W ±10% Single ended
R31,32,33,34 R51,52,53,54	22554103	10 kohm 1/8W ±10% Single ended
R35,36,37,38 R43,44,45,46 R75,77,78	22554102	1 kohm 1/8W ±10% Single ended
R39,40,41,42 R55,56,57	22554123	12 kohm 1/8W ±10% Single ended
R47,48	22544332	3.3 kohm 1/8W ±10% Single ended
R49,50,59,60 R61,62,79,80 R81,82	22554332	3.3 kohm 1/8W ±10% Single ended
R58	22544123	12 kohm 1/8W ±10% Single ended
R63,64	22544224	220 kohm 1/8W ±10% Single ended
R65,66	22554224	220 kohm 1/8W ±10% Single ended
R67,68	22554333	33 kohm 1/8W ±10% Single ended
R69,70	22544333	33 kohm 1/8W ±10% Single ended
R71,72,73,74	22554562	5.6 kohm 1/8W ±10% Single ended
R76	22544102	1 kohm 1/8W ±10% Single ended
R83,84,85,86	22554474	470 kohm 1/8W ±10% Single ended
VR01 A,B,C,D	22650406	100 kohm B Bass TREBLE Variable Resistor
VR02 A,B,C,D	22650406	100 kohm B Bass TREBLE Variable Resistor
MATRIX UNIT ASSEMBLY (CCT-AF-C10)		
TR01,02,03 TR04,05,06 TR07,08,09	31231000	TR-2SC1000-GR Transistor
	CAPACITORS	
C01,02,07,08 C09,10,11,12 C13,14,22,27 C28	22448109	1μF 50WV Electric Capacitor
C03,04,19,20 C25	22445100	10μF 16WV Electric Capacitor
C05,06,21,23 C24,25	23373104	0.1μF 50V ±20% MY
C15,16	22373823	0.082μF 50V ±20% MY
C17,18	22373153	0.015μF 50V ±20% MY

SYMBOL No.	PART No.	DESCRIPTION
	CARBON RESISTORS	
R01,02 R51,52,53	22544683	68 kohm 1/8W ±10% Single ended
R03,04	22544224	220 kohm 1/8W ±10% Single ended
R05,58	22544333	33 kohm 1/8W ±10% Single ended
R06	22544183	18 kohm 1/8W ±10% Single ended
R07	22544334	330 kohm 1/8W ±10% Single ended
R08	22554334	330 kohm 1/8W ±10% Single ended
R09,10,11,12 R59,60	22544103	10 kohm 1/8W ±10% Single ended
R13,15	22554563	56 kohm 1/8W ±10% Single ended
R14,16	22544563	56 kohm 1/8W ±10% Single ended
R17,19,20,23	22544223	22 kohm 1/8W ±10% Single ended
R18,24,47,48	22554223	22 kohm 1/8W ±10% Single ended
R21,22	22544104	100 kohm 1/8W ±10% Single ended
R25,26	22544330	33 ohm 1/8W ±10% Single ended
R27,28	22554123	12 kohm 1/8W ±10% Single ended
R29,39,63	22554393	39 kohm 1/8W ±10% Single ended
R30,37,38,72 R73	22554103	10 kohm 1/8W ±10% Single ended
R31,32	22544274	270 kohm 1/8W ±10% Single ended
R33,34	22554682	6.8 kohm 1/8W ±10% Single ended
R35	22544182	1.8 kohm 1/8W ±10% Single ended
R36	22554182	1.8 kohm 1/8W ±10% Single ended
R40	22554273	27 kohm 1/8W ±10% Single ended
R41,42	22554224	220 kohm 1/8W ±10% Single ended
R43,44,45,46	22554332	3.3 kohm 1/8W ±10% Single ended
R49,50	22554153	15 kohm 1/8W ±10% Single ended
R54	22554683	68 kohm 1/8W ±10% Single ended
R55,61,62,64	22554105	1 Mohm 1/8W ±10% Single ended
R56	22544684	680 kohm 1/8W ±10% Single ended
R57	22554333	33 kohm 1/8W ±10% Single ended
R65	22554123	12 kohm 1/8W ±10% Single ended
R68,69	22544822	8.2 kohm 1/8W ±10% Single ended
R70	22544102	1 kohm 1/8W ±10% Single ended
R71	22554102	1 kohm 1/8W ±10% Single ended
LOUDNESS UNIT ASSEMBLY (CCT-SWI-C01)		
	22142731	SWI-C01-PCB PC BOARD
	CAPACITORS	
C01,02,03,04	22362151	150pF 50V ±10% CC (SL)
C05,06,07,08	22373103	0.01μF 50V ±20% MY
	CARBON RESISTORS	
R01,02,03,04	22544273	27 kohm 1/8W ±10%
HIGH FILTER UNIT (CCT-SWI-C02)		
	22142732	SWI-C02-PCB PC BOARD
	CAPACITORS	
C01,02,03,04	22373103	0.01μF 50V ±20% MY

SYMBOL No.	PART No.	DESCRIPTION
LOW FILTER UNIT ASSEMBLY (CCT-SWI-C03)		
	22142733	SWI-C03-PCB PC BOARD
	CAPACITORS	
C01,02,03,04	22373103	0.01 μF 50V ±20% MY
	CARBON RESISTORS	
R01,02,03,04	22544474	470 kohm 1/8W ±10%
MUTING UNIT ASSEMBLY (CCT-SWI-C05)		
	22142735	SWI-C05-PCB PC BOARD
	CARBON RESISTORS	
R01,02,03,04	22544103	10 kohm 1/8W ±10%
R05,06,07,08	22544104	100 kohm 1/8W ±10%
TAPE MONITOR UNIT ASSEMBLY (CCT-SWI-C06)		
	22142736	SWI-C06-PCB PC BOARD
	CARBON RESISTORS	
R01,02,03,04	22544472	4.7 kohm 1/8W ±10%
FILTER UNIT ASSEMBLY (CCT-FILT-C01)		
	CAPACITORS	
C01,02,03,04 C05,06,07,08	22448109	1μF 50WV Electric Capacitor
CC9,10,11,12	22448229	2.2μF 50WV Electric Capacitor
	CARBON RESISTORS	
R01,02,03,04 R05,06,07,08	22544473	47 kohm 1/8W ±10%
R09,10,11,12	22544223	22 kohm 1/8W ±10%
PHASE INVERTER UNIT ASSEMBLY (CCT-AF-C13)		
TR01,02	31231000	TR-2SC1000-GR Transistor
	CAPACITORS	
C01,02,03,04 C05,06	22448109	1μF 50WV Electric Capacitor
C07,08	22362470	47pF 50WV ±10% CC (SL)
	CARBON RESISTORS	
R01,02	22544154	150 kohm 1/8W ±10%
R03,04,07,08	22544562	5.6 kohm 1/8W ±10%
R05,06	22544683	68 kohm 1/8W ±10%
R09,10	22544474	470 kohm 1/8W ±10%
DRIVER UNIT ASSEMBLY (CCT-AF-C04)		
TR01,02		2SA561-Y
TR03,04		2SA561-Y
TR05,06		2SC497-Y
TR07,08		2SC497-Y
TR09,10		2SC497-Y
TR11,12		2SA497-Y

SYMBOL No.	PART No.	DESCRIPTION
TR13,14		2SC496
D01,02		S3016-R To M8513A-R (Modification)
D03,04		S3016-R To M8513A-R (Modification)
	RESISTORS	
R01,02	22544474	47 kohm ±10% 1/8W RD
R03,04	22544332	3.3 kohm ±10% 1/8W RD
R05,06	22544104	100 kohm ±10% 1/8W RD
R07,08	22544473	47 kohm ±10% 1/8W RD
R09,10	22544562	5.6 kohm ±10% 1/8W RD
R11,12	22544562	5.6 kohm ±10% 1/8W RD
R13,14	22570021	100 ohm ±10% 2W RN
R15,16	22544821	820 ohm ±10% 1/8W RD
R17,18	22544273	27 kohm ±10% 1/8W RD
R19,20	22544102	1 kohm ±10% 1/8W RD
R21,22	22544222	2.2 kohm ±10% 1/8W RD
R23,24	22544392	3.9 kohm ±10% 1/8W RD
R25,26	22544221	220 ohm ±10% 1/8W RD
R27,28	22544221	220 ohm ±10% 1/8W RD
R29,30	22500047	10 ohm ±10% 5W RW
VR01,02	22658188	300 kohm Semifixed
VR03,04	22658189	500 ohm Semifixed
	CAPACITORS	
C01,02	22448109	1μF/50WV CE
C03,04	22447470	47μF/35WV CE
C05,06	22373224	0.22μF 50V ±20% MY
C07,08	22443330	33μF/10WV
C09,10	22362220	22pF 50V ±10% CC (SL)
C11,12	22447221	220μF/35WV CE
C13,14	22362221	220pF 50V ±10% CC (SL)
C15,16	22373103	0.01μF 50V ±20% MY
C17,18	22373104	0.1μF 50V ±20% MY
C19,20	22362470	47pF 50V ±10% CC (SL)
POWER SUPPLY UNIT ASSEMBLY (CCT-SPLY-C06)		
	TRANSISTOR & DIODE	
TR01	31240235	TR-2SD235-0
D02	37682020	D-1D-2C1
D03	31112121	D-1S2121A
	CAPACITORS	
C03,04	22448471	470μF 50WV Electric Capacitor
C05	22448221	220μF 50WV Electric Capacitor
C06,07	22446221	220μF 25WV Electric Capacitor
C08	22430019	1000μF 35WV Electric Capacitor
C11,12	22340030	0.01μF 500V $\pm^{100}_{0}\%$ CK
C15	22447471	470μF 35WV Electric Capacitor
	CARBON RESISTORS	
R01	22570022	220 ohm ±10% 2W Cement type
R02	22570038	3.9 kohm ±10% 2W Metalized film
R03	22574391	390 ohm ±10% 2W Metalized film
R04	22570021	100 ohm ±10% 2W Cement type
F01,02	22144187	FUSE 1.2A UL Metalized film